



Australian Government

UET12 Transmission, Distribution and Rail Sector Training Package

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UET12 Transmission, Distribution and Rail Sector Training Package

Modification History

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UET12 Electricity Supply Industry - Transmission, Distribution and Rail Sector Training Package Version 1

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UET12 Electricity Supply Industry - Transmission, Distribution and Rail Sector Training Package Version 1

Disclaimer

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Electricity Supply Industry - Transmission, Distribution and Rail Sector Training Package (UET12)

Version modification history

The version details of this endorsed Training Package which contains the vocational standards for industry is in the table below. The latest information is at the top of the table.

Version	Release Date	Authorisation	Comments
UET12 Version 2.1	31/10/2014	ISC Upgrade	<p>Qualifications Updated: UET20412; UET20512; UET20612; UET30512; UET30612; UET30712; UET30812;; UET50312; UET60312.</p> <p>Units Updated: UETTDRRF03B; UETTDRRF04B; UETTDRRF05B; UETTDRRF06B; UETTDRRF07B; UETTDRRF10B; UETTDRSB39A; UETTDRSO32A; UETTDRSO33A; UETTDRSO44A; UETTDRSO50A; UETTDRSO51A;.</p> <p>Skill Sets Updated: UETSS00020; UETSS00021; UETSS00022; UETSS00024; UETSS00025; UETSS00026; UETSS00027; UETSS00028; UETSS00029; UETSS00030; UETSS00031; UETSS00032; UETSS00033; UETSS00034.</p>
UET12 Version 2	17/03/2013	NSSC Endorsed	<p>New Qualifications UET50312; UET60312.</p> <p>Qualifications Updated: UET20412; UET20512; UET20612; UET30512; UET30612; UET30712; UET30812; UET30912; UET40412; UET40512; UET40612; UET50212; UET60212;</p>

			<p>Editorial Amendments:</p> <p>Units Updated: UETTFRIS32A; UETTDRIS33A; UETTDRIS49A; UETTDRDP99A; UETTDREL18A; UETTDREL19A; UETTDREL20A; UETTDREL21A;</p> <p>Imported Units Updated UEENEED101A; CPCCCM2007B; HLTCPR211A; HLTF311A; UEENEED104A; UEENEED117A; UEENEEE102A;</p> <p>Correct core and elective weightings: UEE30712; UET30812</p> <p>Correct imported unit name: UEENEED101A; UEENEED104A; UEENEED117A; UEENEEE102A; UEENEEK116A.</p> <p>Include full pre-requisite chain: UETTDRIS32A; UETTDRIS33A; UETTDRIS49A.</p> <p>Skill sets amended: All skill sets in the package have had their requirements mapped. Added requirement to hold and be current in HLTCPR211A in: UET12 Refresher - Perform EWP Rescue and CPR; UET12 Refresher - Perform Pole Top Rescue and CPR</p>
<p>UET12 Version 1</p>	<p>TBC</p>	<p>TBA</p>	<p>The following qualifications were added: UET20312; UET20412; UET20612; UET30512; UET30612; UET30712; UET30812; UET30912; UET40412; UET40512; UET40612; UET50212; UET60212</p> <p>The following qualifications were replaced: UET20110; UET20209; UET30109; UET30209; UET30309; UET30409; UET40109; UET40209; UET40309;</p>

		<p>UET50109; UET60109</p> <p>The following qualifications were amended:</p> <p>UET20511</p> <p>The following new units were added:</p> <p>UETTDRCJ21A; UETTDRCJ22A; UETTDRCJ23A; UETTDRCJ24A; UETTDRCJ25A; UETTDRCJ26A; UETTDRCJ27A; UETTDRCJ28A; UETTDRCJ29A; UETTDRCJ30A; UETTDRCJ31A; UETTDRCJ32A; UETTDRCJ33A; UETTDRCJ34A; UETTDRCJ99A; UETTD RDP11A; UETTD RDP12A; UETTD RDP13A; UETTD RDP14A; UETTD RDP15A; UETTD RDP99A; UETTD RDS31A; UETTD RDS32A; UETTD RDS33A; UETTD RDS34A; UETTD RDS35A; UETTD RDS36A; UETTD RDS37A; UETTD RDS38A; UETTD RDS39A; UETTD RDS40A; UETTD RDS41A; UETTD RDS42A; UETTD RDS43A; UETTD RDS44A; UETTD RDS45A; UETTD RDS46A; UETTD RDS47A; UETTD RDS48A; UETTD RDS49A; UETTD RDS50A; UETTD RDS51A; UETTD RDS52A; UETTD RDS53A; UETTD RDS54A; UETTD RDS55A; UETTD RDS56A; UETTD RDS57A; UETTD RDS58A; UETTD REL11A; UETTD REL12A; UETTD REL13A; UETTD REL14A; UETTD REL15A; UETTD REL16A; UETTD REL17A; UETTD REL18A; UETTD REL19A; UETTD REL20A; UETTD REL21A; UETTD RIS32A; UETTD RIS33A; UETTD RIS34A; UETTD RIS35A; UETTD RIS36A; UETTD RIS37A; UETTD RIS38A; UETTD RIS41A; UETTD RIS42A; UETTD RIS43A; UETTD RIS44A; UETTD RIS45A; UETTD RIS46A; UETTD RIS47A; UETTD RIS48A; UETTD RIS49A; UETTD RIS50A; UETTD RIS51A; UETTD RIS52A; UETTD RIS53A; UETTD RIS54A; UETTD RIS55A;</p>
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			UETTDRIS56A; UETTDRIS57A; UETTDRIS58A; UETTDRIS59A; UETTDRIS60A; UETTDRIS61A; UETTDRIS62A; UETTDRIS63A; UETTDRIS64A; UETTDRIS65A; UETTDRIS66A; UETTDRIS67A; UETTDRIS68A; UETTDRIS69A; UETTDRIS70A; UETTDRIS71A; UETTDRIS72A; UETTDRIS73A; UETTDRIS74A; UETTDRIS81A; UETTDRIS99A; UETTDRRF11A; UETTDRRT21A; UETTDRRT22A; UETTDRRT23A; UETTDRRT24A; UETTDRRT25A; UETTDRRT26A; UETTDRRT27A; UETTDRRT28A; UETTDRRT29A; UETTDRRT30A; UETTDRRT31A; UETTDRRT32A; UETTDRRT33A; UETTDRRT34A; UETTDRRT35A; UETTDRRT36A; UETTDRRT37A; UETTDRRT99A; UETTDRSB21A; UETTDRSB22A; UETTDRSB23A; UETTDRSB24A; UETTDRSB25A; UETTDRSB26A; UETTDRSB27A; UETTDRSB29A; UETTDRSB30A; UETTDRSB31A; UETTDRSB32A; UETTDRSB33A; UETTDRSB34A; UETTDRSB35A; UETTDRSB36A; UETTDRSB37A; UETTDRSB38A; UETTDRSB39A; UETTDRSO32A; UETTDRSO33A; UETTDRSO34A; UETTDRSO35A; UETTDRSO36A; UETTDRSO37A; UETTDRSO38A; UETTDRSO39A; UETTDRSO40A; UETTDRSO41A; UETTDRSO42A; UETTDRSO43A; UETTDRSO44A; UETTDRSO45A; UETTDRSO46A; UETTDRSO47A; UETTDRSO48A; UETTDRSO49A; UETTDRSO50A; UETTDRSO51A; UETTDRTTP22A; UETTDRTTP23A; UETTDRTTP24A; UETTDRTTP25A; UETTDRTTP26A; UETTDRTTP27A; UETTDRTTP28A; UETTDRTTP29A; UETTDRTTP30A; UETTDRTTP31A; UETTDRTTP32A; UETTDRTTP33A; UETTDRTTP34A; UETTDRTTP35A; UETTDRTTP99A; UETTDRTS21A; UETTDRTS22A; UETTDRTS23A;
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		<p>UETTDRTS24A; UETTDRTS25A; UETTDRTS26A; UETTDRTS27A; UETTDRTS28A; UETTDRTS29A; UETTDRTS30A; UETTDRTS31A; UETTDRTS32A; UETTDRTS33A; UETTDRTS34A; UETTDRTS35A; UETTDRTS36A; UETTDRTS37A; UETTDRTS38A; UETTDRVC21A; UETTDRVC23A; UETTDRVC24A; UETTDRVC25A; UETTDRVC26A; UETTDRVC27A; UETTDRVC29A; UETTDRVC30A; UETTDRVC31A; UETTDRVC32A; UETTDRVC33A; UETTDRVC34A</p> <p>The following units were replaced:</p> <p>UETTDRCJ01B; UETTDRCJ02B; UETTDRCJ03B; UETTDRCJ04B; UETTDRCJ05B; UETTDRCJ06B; UETTDRCJ07B; UETTDRCJ08B; UETTDRCJ09B; UETTDRCJ10B; UETTDRCJ11B; UETTDRCJ12B; UETTDRCJ13B; UETTDRCJ14B; UETTDRDP01B; UETTDRDP02B; UETTDRDP03B; UETTDRDP04B; UETTDRDP05B; UETTDRDS01B; UETTDRDS02B; UETTDRDS03B; UETTDRDS04B; UETTDRDS05B; UETTDRDS06B; UETTDRDS07B; UETTDRDS08B; UETTDRDS09B; UETTDRDS10B; UETTDRDS11B; UETTDRDS12B; UETTDRDS13B; UETTDRDS14B; UETTDRDS15B; UETTDRDS16B; UETTDRDS17B; UETTDRDS18B; UETTDRDS19B; UETTDRDS20B; UETTDRDS21B; UETTDRDS22B; UETTDRDS23B; UETTDRDS24B; UETTDRDS25B; UETTDRDS26B; UETTDRDS27B; UETTDRDS28B; UETTDREL01B; UETTDREL02B; UETTDREL03B; UETTDREL04B; UETTDREL05B; UETTDRIS01B; UETTDRIS02B; UETTDRIS03B; UETTDRIS04B; UETTDRIS27B; UETTDRIS06B; UETTDRIS07B; UETTDRIS08B; UETTDRIS09B; UETTDRIS10B; UETTDRIS11B; UETTDRIS12B;</p>
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			UETTDNIS13B; UETTDNIS14B; UETTDNIS15B; UETTDNIS16B; UETTDNIS17B; UETTDNIS18B; UETTDNIS19B; UETTDNIS20B; UETTDNIS21B; UETTDNIS22B; UETTDNIS23B; UETTDNIS24B; UETTDNIS25B; UETTDNIS26B; UETTDNRRF01A; UETTDNRRF02A; UETTDNRRF03A; UETTDNRRF04A; UETTDNRRF05A; UETTDNRRF06A; UETTDNRRF07A; UETTDNRRF08A; UETTDNRRF09A; UETTDNRRF10A; UETTDNRRT01B; UETTDNRRT02B; UETTDNRRT03B; UETTDNRRT04B; UETTDNRRT05B; UETTDNRRT06B; UETTDNRRT07B; UETTDNRRT08B; UETTDNRRT09B; UETTDNRRT10B; UETTDNRRT11B; UETTDNRRT12B; UETTDNRRT13B; UETTDNRRT14B; UETTDNRRT15B; UETTDNRSB01B; UETTDNRSB02B; UETTDNRSB03B; UETTDNRSB04B; UETTDNRSB05B; UETTDNRSB06B; UETTDNRSB07B; UETTDNRSB09B; UETTDNRSB10B; UETTDNRSB11B; UETTDNRSB12B; UETTDNRSB13B; UETTDNRSB14B; UETTDNRSB15B; UETTDNRSB16B; UETTDNRSB17B; UETTDNRSB18B; UETTDNRSO02B; UETTDNRSO03B; UETTDNRSO04B; UETTDNRSO05B; UETTDNRSO06B; UETTDNRSO07B; UETTDNRSO08B; UETTDNRSO09B; UETTDNRSO10B; UETTDNRSO11B; UETTDNRSO12B; UETTDNRSO13B; UETTDNRSO14B; UETTDNRSO15A; UETTDNRSO16A; UETTDNRSO17A; UETTDNRSO18A; UETTDNRSO19A; UETTDNRSO20A; UETTDNRSO21A; UETTDNRTP02B; UETTDNRTP03B; UETTDNRTP04B; UETTDNRTP05B; UETTDNRTP06B; UETTDNRTP07B; UETTDNRTP08B; UETTDNRTP09B; UETTDNRTP10B; UETTDNRTP11B; UETTDNRTP12B; UETTDNRTP13B; UETTDNRTP14B; UETTDNRTP15B; UETTDNRSTS01B; UETTDNRSTS02B; UETTDNRSTS03B; UETTDNRSTS04B; UETTDNRSTS05B; UETTDNRSTS06B;
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		<p>UETTDRTS07B; UETTDRTS08B; UETTDRTS09B; UETTDRTS10B; UETTDRTS11B; UETTDRTS12B; UETTDRTS13B; UETTDRTS14B; UETTDRTS15B; UETTDRTS16B; UETTDRVC01B; UETTDRVC02B; UETTDRVC03B; UETTDRVC04B; UETTDRVC05B; UETTDRVC06B; UETTDRVC07B; UETTDRVC08B; UETTDRVC09B; UETTDRVC10B</p> <p>UETTDRRF01B; UETTDRRF02B; UETTDRRF03B; UETTDRRF04B; UETTDRRF05B; UETTDRRF06B; UETTDRRF07B; UETTDRRF08B; UETTDRRF09B; UETTDRRF10B</p> <p>The following imported units were added to UET12 Version 1:</p> <p>AHCARB202A; AHCARB204A; AHCARB205A; AHCCHM201A; AHCMOM304A; AHCPCM201A; BSBINM401A; BSBMGT402A; BSBMGT403A; BSBWOR401A; BSBWOR402A; BSBCUS501A; BSBFIM501A; BSBINM501A; BSBINN502A; BSBLED501A; BSBMGT502B; BSBMGT515A; BSBMGT516A; BSBSUS501A; BSBWOR501A; BSBWOR502A; CPCCCM2007A; CPCCLDG3001A; CPCCLHS3001A; CPCCLHS3002A; CPCCLRG3001A; CPCCLRG3002A; CPCCLSF2001A; CPCCLSF3001A; CPCCOHS1001A; HLTFA301B; ICTCBL2065A; ICTCBL2068A; MEM16012A; MEM17003A; NWP218B; NWP261A; RIIOHS202A; RIIOHS204A ; RIIOHS205A; TLIC3003A; TLIC3004A; TLID3035A; TLILIC2001A; TLILIC4011A; TLILIC0012A; TLILIC3003A; TLILIC2005A; TLILIC3008A; TLILIC4009A; UEENEEC101A; UEENEEC108A; UEENEEC110A; UEENEED101A; UEENEED104A; UEENEED117A; UEENEEE083A; UEENEEE101A; UEENEEE102A; UEENEEE103A; UEENEEE104A;</p>
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			<p>UEENEEE105A; UEENEEE107A; UEENEEE108A; UEENEEE124A; UEENEEE125A; UEENEEE126A; UEENEEE137A; UEENEEE151A; UEENEEF106A; UEENEEF107A; UEENEEG006A; UEENEEG033A; UEENEEG063A; UEENEEG076A; UEENEEG101A; UEENEEG102A; UEENEEG103A; UEENEEG104A; UEENEEG105A; UEENEEG106A; UEENEEG107A; UEENEEG108A; UEENEEG109A; UEENEEG149A; UEENEEG171A; UEENEEH102A; UEENEEH112A; UEENEEH139A; UEENEEI155A; UEENEEI155A; UEENEEK101A; UEENEEK102A; UEENEEK103A; UEENEEK104A; UEENEEK105A; UEENEEK106A; UEENEEK116A ; UEENEEK120A ; UEENEEK142A; UEENEEP024A; UEENEEP026A;</p> <p>The following imported units were removed from UET12 Version 1:</p> <p>BSBFLM303B; BSBFLM305B; BSBFLM306B; BSBFLM309B; BSBFLM311B; BSBFLM312A; BSBFLM403B; BSBFLM405B; BSBFLM406B; BSBFLM409B; BSBFLM412A; BSBFLM501B; BSBFLM503B; BSBFLM505B; BSBFLM506B; BSBFLM507A; BSBFLM509B; BSBFLM510B; BSBFLM511B; BSBFLM512B; BSBFLM513A; BSBFLM514A; BSBMGT507A; ICTTC013C; ICTTC064C ; ICTTC065C; ICTTC066C; ICTTC068C; ICTTC069C; ICTTC104C; ICTTC127C; ICTTC131B; ICTTC133B; ICTTC134B; ICTTC135B; UEENEEED002B; UEENEEE007B; UEENEEG001B; UEENEEG002B; UEENEEG047B; UEENEEG048B; UEENEEG049B; UEENEEH011B</p>
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<p>UET09 Version 3</p>	<p>TBA</p>	<p>NQC</p>	<p>Version 2 of UET09 includes the following new components:</p> <p>New Units of Competency</p> <p>UETTDRIS81A</p> <p>New Qualification</p> <p>UET20510 Certificate II in National Broadband Network Cabling Installation and Maintenance</p> <p>New Imported Units</p> <p>UEENEEE037B; UEENEEK042A; UEENEEC001B; UEENEEC008B; UEENEEC010B; UEENEEE051B; UEENEEF006B; UEENEEF007B; CPCCCM2007A; TLID3507C ; TLILIC508A; CPCCOHS1001A; RIIOHS202A; RIIOHS204A ; RIIOHS205A</p>
<p>UET09 Version 2.1</p>	<p>5 August 2010</p>	<p>EE-Oz ISC Upgrade</p> <p>Authorised by NQC to meet Packaging Rule requirements and the inclusion of Sustainability Skills in qualifications.</p>	<p>Modification of the following qualifications to comply with NQC Packaging Rules.</p> <p>UET20110 Certificate II in ESI — Vegetation Control</p>
<p>UET09 Version 2.0</p>	<p>12 February 2010</p>	<p>NQC</p>	<p>Version 2 of UET09 includes the following new components:</p> <p>New Units of Competency</p> <p>UETTDRRF01A</p> <p>UETTDRRF02A</p> <p>UETTDRRF03A</p> <p>UETTDRRF04A</p> <p>UETTDRRF05A</p> <p>UETTDRRF06A</p> <p>UETTDRRF07A</p>

			<p>UETDRRF08A UETDRRF09A UETDRRF10A</p> <p>New Imported Unit HLTCPR201A Perform CPR</p> <p>New Identified Skill Sets Apply Access Procedures to Work On or Near Electrical Network Infrastructure Apply ESI Safety Rules, Codes of Practice and Procedures for Work On or Near Electrical Apparatus Perform Pole Top Rescue Perform Tower Rescue Perform Rescue from Switchyard Structures at Heights Perform EWP Controlled Descent Escape Provide First Aid in an ESI Environment Perform CPR Perform Pole Top Rescue and CPR Perform EWP Rescue and CPR Perform Tower Rescue and Provide First Aid Perform Switchyard Rescue at Heights and Provide First Aid Perform Rescue from a Live LV Panel and CPR Perform Cable Pit/Trench/Excavation Rescue and CPR Perform Cable Pit/Trench/Excavation Rescue Perform Rescue from a Live LV Panel Perform EWP Rescue</p>
<p>UET09 Version 1</p>	<p>30 October 2009</p>	<p>NQC</p>	<p>Reviewed under the 2008 Training Package Development and Endorsement Processes. The following continuous improvement</p>

		<p>changes were made to the preceding Training Package UET06 Version in developing UET09 Version 1.</p> <p>Category 2 changes made as a result of the 2007-08 Training Package Structure Review and the 2007-08 Continuous Improvement Plan. Changes and Additions made include:</p> <p>New Units of Competency</p> <p>UETTDRSO15A Operate and monitor system equipment (SCADA)</p> <p>UETTDRSO16A Monitor and control the activities of field staff</p> <p>UETTDRSO17A Coordinate HV transmission network</p> <p>UETTDRSO18A Respond to discrete/interdependent protection operations</p> <p>UETTDRSO19A Coordinate system operations in a regulated energy market</p> <p>UETTDRSO20A Respond to complex protection operations</p> <p>UETTDRSO21A Manage network power flows</p> <p>UETTDRIS28A Analyse and develop solutions for problems in extra-low voltage, single path circuits</p> <p>UETTDRIS29A Analyse and develop solutions for problems in multiple path d.c. circuits</p> <p>UETTDRIS30A Analyse and develop solutions for problems in electromagnetic circuits</p> <p>UETTDRIS31A Analyse and develop solutions for problems in single and three phase low voltage circuits</p> <p>Revised Units of Competency</p> <p>Changes were made to various sections of the following units including changes to Performance Criteria, Range of Variables, Critical Aspects and EKAS:</p>
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		<p>UETTDRCJ05B; UETTDRCJ11B; UETTDRCJ12B; UETTDRCJ13B; UETTDTRDP01B; UETTDTRDP02B; UETTDTRDP03B; UETTDTRDP04B; UETTDREL01B; UETTDREL02B; UETTDREL03B; UETTDREL04B; UETTDREL05B; UETTDRIS02B; UETTDRIS03B; UETTDRIS04B; UETTDRIS05B; UETTDRIS06B; UETTDRIS07B; UETTDRIS08B; UETTDRIS09B; UETTDRIS10B; UETTDRIS11B; UETTDRIS13B; UETTDRIS14B; UETTDRIS15B; UETTDRIS16B; UETTDRIS17B; UETTDRIS18B; UETTDRIS19B; UETTDRIS20B; UETTDRIS21B; UETTDRIS22B; UETTDRIS23B; UETTDRIS24B; UETTDRIS25B; UETTDRIS26B; UETTDRIS27B; UETTDRT11B; UETTDRT13B; UETTDRSB01B; UETTDRSB02B; UETTDRSB03B ; UETTDRSB04B ; UETTDRSB05B ; UETTDRSB06B; UETTDRSB07B; UETTDRSB09B; UETTDRSB10B; UETTDRSB11B; UETTDRSB12B; UETTDRSB13B; UETTDRSB14B; UETTDRSB15B; UETTDRSB16B; UETTDRSB17B; UETTDRSB18B; UETTDRSO03B; UETTDRSO09B; UETTDRTTP02B; UETTDRTTP03B; UETTDRTTP04B; UETTDRTTP05B; UETTDRTTP07B; UETTDRTTP08B; UETTDRTTP09B; UETTDRTTP10B; UETTDRTTP11B; UETTDRTTP12B; UETTDRTTP13B; UETTDRTTP14B; UETTDRTTP15B; UETTDRTS01B; UETTDRTS02B.</p> <p>Changes to unit pre-requisites were made to the following units:</p> <p>UETTDRCJ01B; UETTDTRDP05B; UETTDRDS01B; UETTDRDS02B; UETTDRDS03B; UETTDRDS04B; UETTDRDS05B; UETTDRDS06B; UETTDRDS07B; UETTDRDS08B; UETTDRDS09B; UETTDRDS10B; UETTDRDS11B; UETTDRDS12B; UETTDRDS13B; UETTDRDS14B;</p>
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			<p>UETTDARDS15B; UETTDARDS16B; UETTDARDS17B; UETTDARDS18B; UETTDARDS19B; UETTDARDS20B; UETTDARDS21B; UETTDARDS22B; UETTDARDS23B; UETTDARDS24B; UETTDARDS25B; UETTDARDS26B; UETTDARDS27B; UETTDARDS28B; UETTDARIS01B; UETTDARIS12B; UETTDARSO02B; UETTDARSO04B; UETTDARSO05B; UETTDARSO06B; UETTDARSO07B; UETTDARSO08B; UETTDARSO10B; UETTDARSO11B; UETTDARSO14B; UETTDARTP06B; UETTDARTS03B; UETTDARTS04B; UETTDARTS05B; UETTDARTS06B; UETTDARTS07B; UETTDARTS08B; UETTDARTS09B; UETTDARTS10B; UETTDARTS11B; UETTDARTS12B; UETTDARTS13B; UETTDARTS14B; UETTDARTS15B; UETTDARTS16B; UETTDARVC01B; UETTDARVC02B; UETTDARVC03B; UETTDARVC04B; UETTDARVC05B; UETTDARVC06B; UETTDARVC07B; UETTDARVC08B; UETTDARVC09B; UETTDARVC10B.</p> <p>Editorial changes described below were made to the above revised units and also to:</p> <p>UETTDARCJ02B; UETTDARCJ03B; UETTDARCJ04B; UETTDARCJ06B; UETTDARCJ07B; UETTDARCJ08B; UETTDARCJ09B; UETTDARCJ10B; UETTDARCJ14B; UETTDARRT01B; UETTDARRT02B; UETTDARRT03B; UETTDARRT04B; UETTDARRT05B; UETTDARRT06B; UETTDARRT07B; UETTDARRT08B; UETTDARRT09B; UETTDARRT10B; UETTDARRT12B; UETTDARRT14B; UETTDARRT15B; UETTDARSO12B; UETTDARSO13B.</p> <p>Revised Qualifications</p> <p>The following qualifications have been revised:</p> <p>UET20109 Certificate II in ESI-Vegetation Control</p>
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		<p>UET20209 Certificate II in ESI-Transmission Line Assembly</p> <p>UET30209 CIII in ESI – Distribution</p> <p>UET30309 CIII in ESI – Rail Traction</p> <p>UET30409 CIII in ESI – Cable Jointing</p> <p>UET30109 CIII in ESI – Transmission</p> <p>UET50109 Diploma of ESI - Power Systems</p> <p>UET60109 Advanced Diploma of ESI - Power Systems</p> <p>Imported Units</p> <p>The following imported units have been included in the Training Package as updated or replacements for superseded imported units.</p> <p>UEENEED004B Use engineering applications software</p> <p>UEENEED017B Install and configure internetworking systems</p> <p>UEENEED027B Develop structured programs to control external devices</p> <p>UEENEED028B Develop and test code for microcontroller devices</p> <p>UEENEEE001B Apply OHS practices in the workplace</p> <p>UEENEEE002B Dismantle, assemble and fabricate electrotechnology components</p> <p>UEENEEE003B Solve problems in extra-low voltage single path circuits</p> <p>UEENEEE004B Solve problems in multiple path d.c. circuits</p> <p>UEENEEE005B Fix and secure equipment</p> <p>UEENEEE006B Apply methods to maintain currency of industry developments</p> <p>UEENEEE007B Use drawings, diagrams, schedules and manuals</p>
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			<p>UEENEEE008B Lay wiring/cabling and terminate accessories for extra-low voltage circuits</p> <p>UEENEEE024B Compile and produce an electrotechnology report</p> <p>UEENEEG001B Solve problems in electromagnetic circuits</p> <p>UEENEEG002B Solve problems in single and three phase low voltage circuits</p> <p>UEENEEG047B Provide computational solutions to power engineering problems</p> <p>UEENEEG048B Solve problems in complex multiple path power circuits</p> <p>UEENEEG049B Solve problems in complex polyphase power circuits</p> <p>UEENEEH002B Carry out basic repairs to electronic apparatus by replacement of components</p> <p>UEENEEH012B Troubleshoot digital subsystems</p> <p>UEENEEH039B Troubleshoot basic amplifiers</p> <p>BSBFLM303C Contribute to effective workplace relationships</p> <p>BSBFLM305C Support operational plan</p> <p>BSBFLM306C Provide workplace information and resourcing plans</p> <p>BSBFLM309C Support continuous improvement systems and processes</p> <p>BSBFLM311C Support a workplace learning environment</p> <p>BSBFLM312B Contribute to team effectiveness</p> <p>BSBWOR401A Implement effective workplace relationships</p> <p>BSBMGT402A Implement operational plan</p> <p>BSBINM401A Implement workplace information system</p>
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			<p>BSBMGT403A Implement continuous improvement</p> <p>BSBWOR402A Promote team effectiveness</p> <p>BSBWOR501A Manage personal work priorities and professional development</p> <p>BSBMGT502B Manage people performance</p> <p>BSBMGT515A Manage operational plan</p> <p>BSBINM501A Manage an information or knowledge management systems</p> <p>BSBCUS501A Manage quality customer service</p> <p>BSBMGT516A Facilitate continuous improvement</p> <p>BSBINN502A Build and sustain an innovative work environment</p> <p>BSBLED501A Develop a workplace learning environment</p> <p>BSBWOR502A Ensure team effectiveness</p> <p>BSBFIM501A Manage budgets and financial plans</p> <p>BSBSUS501A Develop workplace policy and procedures for sustainability</p> <p>ICTTC013D Perform an accurate customer premises cable and system test</p> <p>ICTTC064D Haul underground cable</p> <p>ICTTC065D Splice carrier/service provider optic fibre cable</p> <p>ICTTC066D Joint and terminate coaxial cable</p> <p>ICTTC068D Install telecommunications service to a building</p> <p>ICTTC069D Install network cable equipment</p> <p>ICTTC104D Maintain an electronic system</p>
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		<p>ICTTC127D Supervise worksite activities</p> <p>ICTTC131C Install an above ground equipment enclosure</p> <p>ICTTC133C Construct underground telecommunications infrastructure</p> <p>ICTTC134C Fix aerial cable</p> <p>ICTTC135C Joint metallic conductor cable Access Network</p> <p>Editorial changes to all units resulting from the 2007-08 Training Package Structure Review and this review include:</p> <p>Removal of spaces in any of the unit or qualification codes.</p> <p>Replace ‘Version No. 2.1’ with ‘Version No. 2.1’ in all footers across the whole Training Package.</p> <p>3. For all Units:</p> <p>Change all Unit suffixes for version 1 units from ‘A’ to ‘B’</p> <p>Add ‘1.1 Descriptor’ as a new title</p> <p>Move ‘3.1 License to practise’ to position 1.2</p> <p>Move the sub-heading ‘2.1 Competencies’ from the left hand column to the right hand column</p> <p>Move the sub-heading ‘2.2 Literacy and Numeracy skills’ from the left hand column to the right hand column</p> <p>Include ‘3) Employability Skills’ and text therein as a whole new section</p> <p>Revise the numbering of all subsequent sections to accommodate the inclusion of the Employability Skills section at 3)</p> <p>Include "All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies" as a new paragraph in ‘7) Required Skills and Knowledge’</p>
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			<p>Change all references to sections within a unit to reflect the correct section (may require change as a result of the inclusion of the Employability Skills section at 3).</p> <p>Completely remove the ‘Key Competencies’ and ‘Skills Enabling Employment’ sections.</p> <p>Amendment of prerequisites section of the units:</p> <p>UETTDRCJ13B; UETTDRCJ14B; UETTDNIS06B; UETTDNIS07B; UETTDNIS27B; UETTDNRT14B; UETTDNRT15B; UETTDNRB01B; UETTDNRB02B; UETTDNRB03B; UETTDNRB04B; UETTDNRB05B; UETTDNRB06B; UETTDNRB07B; UETTDNRB09B; UETTDNRB10B; UETTDNRB11B; UETTDNRB12B; UETTDNRB13B; UETTDNRB14B; UETTDNRB15B; UETTDNRB16B; UETTDNRB17B; UETTDNRB18B; UETTDNTP14B; UETTDNTP15B;</p> <p>To include:</p> <p>Entry into this unit requires a current ‘Unrestricted Electrician’s Licence’ or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician’s licence.</p> <p>This better reflect the fact that the ERAC requirements can be met via a number of qualifications from the UEE07 Electrotechnology Training Package. This statement also reduces the prerequisite chain for these units.</p>
1	2006	NQC	Primary Release of Revised Training Package UET06 replacing UTT98

Preliminary Information

Preliminary Information

The Electricity Supply Industry — Transmission, Distribution and Rail

The Electricity Supply Transmission and Distribution Industry conveys electricity from the generating power stations to the consumer by means of a reticulation system that includes the following component sections:

- The distribution of electricity by means of overhead conductors and poles. This is usually reticulation in built up areas in both industrial/commercial and residential settings or rural settings.
- The distribution of electricity by means of underground cables where installation and cable jointing are specific skills. This is usually reticulation in built up areas in both industrial/commercial and residential settings.
- The transmission of electricity by means of overhead conductors suspended from towers (or larger concrete or wooden poles) at voltages substantially higher than those used for distribution
- The transmission of electricity by means of underground cables that are usually oil or gas filled requiring special skills in installation and maintenance.

In addition to mainstream linework and cable jointing functions, powerline workers are being called on, in some areas, to undertake such tasks as substation installation and maintenance, specialised testing, revenue meter installation and the like. Some electrical distributors are multi-skilling their powerline personnel with additional mainstream electrical skills, such as those held by electricians.

The industry has undergone rapid changes in work methods, staffing levels, management approaches and the sub-contracting of many work functions to external contractors. The industry has always had a commitment to training and safety and is now embracing the spirit of the National Training Reform Agenda.

The main activities of the industry are installation, service, maintenance, diagnosis and repair of electrical cabling systems, apparatus and equipment in relation to:

- Overhead lines (distribution)
- Overhead lines (transmission)
- Cable jointing
- Equipment installation.

Examples of Electricity Supply Industry – Transmission, Distribution and Rail sector vocations are Overhead powerline worker (distribution); Overhead powerline worker (transmission); Rail Traction Lineworker and Cable jointer.

Technological innovation in the range of work activities and the vocations involved in Electricity Supply Industry — Transmission and Distribution sector systems provide good career opportunities.

There are three specific areas that provide individuals with the chance to enter an exciting career in the Transmission and Distribution sector of the Electricity Supply Industry and gain a nationally recognised qualification.

Transmission (Powerline)

Work in the area of Electricity Transmission involves installing and maintaining towers and associated hardware as well as stringing and maintaining overhead conductors and cables. Trainees in this program will be exposed to a range of experiences, designed to give them the expertise required for a career in this sector.

Distribution (Powerline)

The distribution of electricity throughout Australia involves the installation and maintenance of underground cables, overhead conductors, associated hardware and public lighting. This program enables trainees to acquire the skills and knowledge needed for a career in power line distribution.

Rail Traction (Powerline)

The distribution of electricity used for transporting of people and goods by various types of rail traction vehicles (e.g. tram and train) involves the carrying out of construction, maintenance and inspection of overhead traction wiring systems and equipment in accordance with legislative rules and regulations.

Industry coverage

The formal industry coverage is under ANZSIC Code 3610 in which the sector is defined as consisting of units mainly engaged in the generation, transmission or distribution of electricity.

The sector has been characterised during the last few years by the privatisation of many enterprises and the out-sourcing of many functions and activities.

Notwithstanding these changes the Competency Standards in this Package cover approximately one third of the Electricity Supply Industry's direct workforce of 47,000 employees. The Standards may also provide coverage for the increasing contractor workforce, which is required to support sector activities.

The ESI Transmission, Distribution and Rail sector of the Industry contributes greatly to the economic and future needs of Australia.

Regulatory arrangements

The industry is subject to a high level of legislation, regulation, codes of practice, guidelines and advisory standards related to the research, assembly, installation, construction, diagnostics, maintenance, commission, program, test or repair of; networks, systems, circuits, equipment, components, appliances, facilities and the like in the field of electricity. The regulatory requirements are typically based on the principle of operation of wiring systems and associated circuits involving equipment, apparatus and systems, public safety, safety and health of individuals who work on lines/circuits, systems and apparatus/equipment and other codes and practices related to the environment in which they operate.

Where possible, relevant and current regulatory requirements have been incorporated into this Training Package to assure outcomes are complementary to regulation. Where regulatory requirements are amended or introduced such outcomes are to be incorporated in training and assessment delivery. Continuous improvement and maintenance arrangements included in this Training Package will endeavour to maintain pace with changes.

Statutes, regulations and codes of practice

Federal, State and Territory Electricity, Telecommunications, Anti-discrimination, Occupational Health and Safety and Work Cover Acts and Regulations typically cover the Industry. Additionally, there are many Australian/New Zealand and International Standards, codes of practices and regulations that apply and to which observance is essential for assuring life, property and commerce. Thus, relevant legislative, regulatory codes of practice, guidelines and advisory standard requirements form an integral part of the obligatory requirements in the vocational standards found in this Training Package. The following websites can be a useful starting point for the latest information:

Other industry standards

It is recognised that the National Transmission and Distribution Sector Standards do not cover all the competencies, which are likely to be required and applied within Electricity Supply Industry workplaces. Nationally endorsed competency standards from other industries will be used where appropriate and the concept of cross-industry disciplinary standards will be encouraged. Specific rules have been included within this Training Package to address these arrangements.

Overview

What is a Training Package?

A Training Package is an integrated set of nationally endorsed competency standards, assessment guidelines and Australian Qualifications Framework (AQF) qualifications for a specific industry, industry sector or enterprise.

Each Training Package:

- provides a consistent and reliable set of components for recognised performance and determining training, recognising and assessing people's skills, and may also have optional support materials
- enables nationally recognised qualifications to be awarded through assessment against given industry Competency Standard Units
- encourages the development and delivery of flexible training and assessment which suits individual and industry requirements
- encourages learning and assessment in a work-related environment which leads to verifiable industry outcomes.

How do Training Packages fit within the National Training Framework?

The National Training Framework is made up of the nationally agreed quality arrangements for the vocational education and training sector, the Australian Quality Training Framework (AQTF), and Training Packages which contain the vocational standards for industry, endorsed by the National Quality Council (NQC).

How are Training Packages developed?

Training Packages are developed by Industry Skills Councils to meet the identified training needs of specific industries or industry sectors. To gain national endorsement of a Training Package, developers must provide evidence of extensive research, consultation and support within the industry area.

How do Training Packages encourage flexibility?

Training Packages describe the skills and knowledge needed to perform effectively in the workplace without prescribing how people should be trained. It is acknowledged that people can achieve vocational competency in many ways and Training Packages emphasise what learners can do, not how or where they learned to do it. For example, some experienced workers might be able to demonstrate competency against the competency standard units, and even gain a qualification without completing a formal training program.

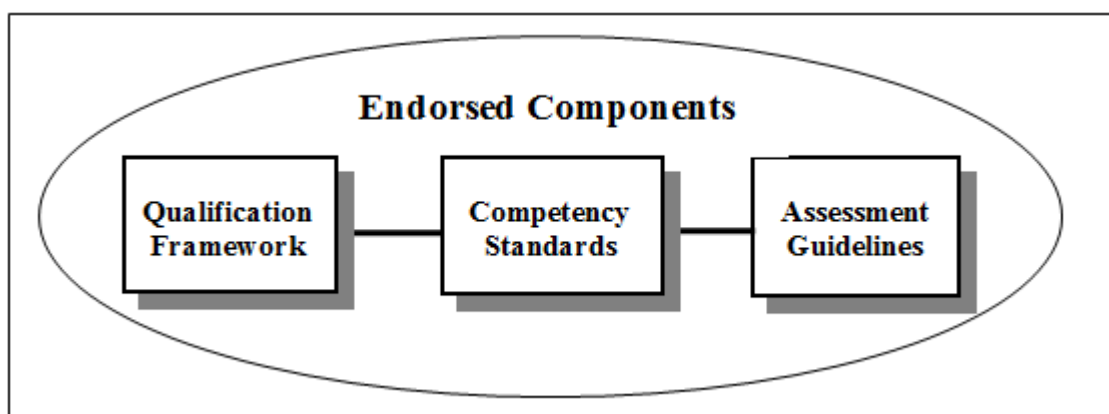
Assessment and training may be conducted at the workplace, off-the-job, at a training organisation, during regular work, or through work experience, work placement, work simulation or any combination of these.

Who can deliver and assess using Training Packages?

Training and assessment, using Training Packages must be conducted by a Registered Training Organisation (RTO) that has the qualifications or specific Competency Standard Units on its scope of registration, or that works in partnership with another RTO as specified in the AQTF Standards for RTOs.

Training Package Components

Training Packages are made up of mandatory components endorsed by the NQC and optional support materials. The nationally endorsed components include the Qualification Framework, Competency Standard Units and Assessment Guidelines. These form the basis of training and assessment in the Training Package and must be used.



Qualifications Framework

Each Training Package provides details of the competency standards that must be achieved to award AQF qualifications or Statements of Attainment for part of a qualification. The rules, which determine which Competency Standard Units can be combined to make up a valid AQF qualification in the Training Package, are known as "package rules". These packaging rules must be followed to ensure the integrity of validating recognised qualifications issued.

Competency Standard Units

Each Competency Standard Unit identifies a discrete workplace requirement and includes the knowledge and skills that underpin competency as well as language, literacy and numeracy and Occupational Health and Safety requirements. The Competency Standard Units must be adhered to in training and assessment to ensure consistency of outcomes.

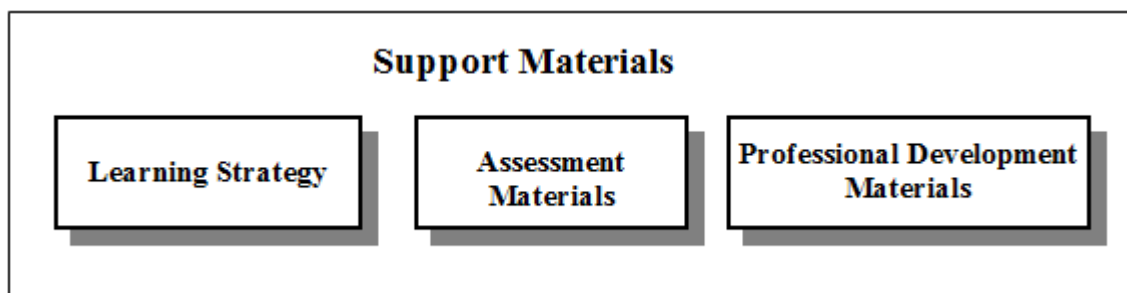
Assessment Guidelines

The Assessment Guidelines provide an industry framework to ensure all assessment outcomes meet industry needs and the nationally agreed standards as expressed in the Training Package and the AQTF Standards for RTOs. The Assessment Guidelines must be followed to ensure integrity of assessment.

Training Package Support Materials

The endorsed components of a Training Package are complemented and supported by optional support materials that provide for choice in the design of training and assessment to meet the needs of industry, RTOs and learners. In some instances the Industry Skills Council may have developed a Training Package and industry support material to assist RTOs in delivering the preferred industry approach. These support materials should be considered by RTOs in accordance with the relevant AQTF standard in an effort to support increased national consistency and assure industry of the quality of outcomes.

A Training Package can relate to single or multiple competency standard units, an industry sector, a qualification or the whole Training Package. They tend to fall into one or more of the categories below.



A range of stakeholders can produce a Training Package support materials, however, to ensure national consistency, partnership or collaborative approaches are preferred. Support materials developers include Industry Skills Councils, RTOs, individual trainers and assessors, private and commercial developers and government agencies.

Where support materials have been quality assured through a process of ‘noting’ by the NQC, they display the official logo, shown below. Noted support materials are listed on the National Training Information Service (NTIS), together with a detailed description and information on the type of product and their availability (www.ntis.gov.au).



It is not compulsory to submit support materials for noting, any resources that meet the requirements of the Training Package can be used.

Training Package Codes

There are agreed conventions for the national codes used in Training Packages and their components. Always use the correct codes, exactly as they appear in the Training Package, and with the title always following the code.

Each Training Package has a unique five-character national code assigned when the Training Package which contains the vocational standards for industry is endorsed, for example UET09. The first three characters are letters identifying the Training Package which contains the vocational standards for industry coverage and the last two characters are numbers identifying the year of endorsement.

Qualification Codes

Each Training Package qualification has a unique eight-character code, for example in this Training Package UET30109. In qualification codes, the:

- first three characters are letters identifying the Training Package
- fourth is a number reflecting the AQF level for the qualification
- fifth and sixth characters represent the number of the qualification for the given level. That is in the case of UET30105, it is the first qualification of currently four AQF3 qualifications on offer in the Training Package.
- seventh and eighth numbers identify the year in which the qualification was endorsed. Any subsequent amendments to the qualification result in this number changing to reflect the new year of endorsement.

Competency Standard Unit Codes

Each Unit has a unique code. A typical code is made up of a maximum of 12 characters; normally a mixture of uppercase letters and numbers. For example in this Training Package the following approach has been adopted:

Unit Number										
U	E	T	T	D	R					A
Industry – EE-Oz Training Standards identifier			Training Package identifier			Discipline ← letters →		Numbers 01 to 99		Version
← 12 Characters Maximum →										

Where an amendment is made to a Competency Standard Unit the following applies:

- where changes do not affect the outcome of the unit the last character alpha identifier is incremented to indicate the new version. For example, UETTDRIS12A is changed to UETTDRIS12B.
- where changes alter the outcome, a new unit title and code is assigned.

Training Package, Qualification and Competency Standard Units Titles

There are agreed conventions for titling Training Packages and their components. Always use the correct titles, exactly as they appear in the Training Package which contains the vocational standards for industry, and with the code always placed before the title.

Training Package Titles

The title of each endorsed Training Package is unique and relates to the industry's broad coverage.

Qualification Titles

The title of each endorsed Training Package qualification is unique. Qualification titles use the following sequence:

- first, the qualification is identified as either Certificate I, Certificate II, Certificate III, Certificate IV, Diploma or Advanced Diploma
- this is followed by the words 'in' for Certificates I to IV and 'of' for Diploma and Advanced Diploma
- then the industry descriptor follows, for example Electricity Supply Industry (ESI) – Distribution, Transmission or Rail, and
- if applicable, the occupational or functional stream follows in brackets, for example (Powerline). For example Certificate III in ESI Distribution (Powerline) or Diploma of ESI Power Systems.

Competency Standard Unit Titles

Each competency standard unit title is unique. This title describes the competency outcome concisely, and is written in sentence case. For example:

- UETTDRIS04A Perform high voltage field switching to a given schedule
- UETTDRIS26A Manage an ESI OHS management system
-

The Electricity Supply Industry - Transmission, Distribution and Rail Training Package

The Electricity Supply Industry - Transmission, Distribution and Rail Training Package

The revised Electricity Supply Industry – Transmission, Distribution and Rail Training Package has been developed, reviewed and validated through extensive industry consultation. It reflects the views of a wide cross-section of the industry and its key stakeholders/practitioners throughout Australia.

This Training Package for the Electricity Supply Industry – Transmission, Distribution and Rail (UET12) has been developed on behalf of the EnergyUtilities Industry and community stakeholders from all States/Territories of Australia by EE-Oz Training Standards, with the support of DEEWR. EE-Oz Training Standards operates under a charter from DEEWR as a declared National ElectroComms and EnergyUtilities Industry Skills Council for the ElectroComms and EnergyUtilities Industry. EnergyUtilities Industry practitioners, regulators, government agencies and community stakeholders contributed much effort, support and knowledge in its development.

The first Training Package for this sector of the Electricity Supply Industry was released in 1998, as the Training Package for the Electricity Supply Industry – Transmission and Distribution Sector of the Utilities Industry (UTT98). At that time it broke new ground for setting nationally recognised qualifications comprised of Competency Standard Units as they related to work performance. It assisted in benchmarking the design of training and assessment processes and practices. Since its initial release, it has undergone two version changes. The changes incorporated Certificate IV qualifications and subsequently a Rail Traction qualification as well as other minor amendments.

In its revised form the Electricity Supply Industry – Transmission, Distribution and Rail Training Package has gone even further in improving currency and relevance to industry by enhancing the range of qualifications and Competency Standard Units available with added flexibility to the industry. It includes an array of new and revised Competency Standard Units, pathways and design features.

The previous competency standard units have been revamped, reorganised and updated over 200 new Competency Standard Units across five levels of the AQF. The result is a Training Package that is more relevant to the industry. It readily responds to the needs and responsibilities of the future, both in technology and work organisation.

New skilled career pathways have also been developed that suit employment-based new entrants, as well as the existing workforce or those with pre-existing skill sets.

Table 1 Summary of AQF Qualifications in this Training Package

The AQF qualifications in the Electricity Supply Industry — Transmission, Distribution and Rail Training Package are:

AQF Level	Qualification Code	Qualification Title
2	UET20312	Certificate II in ESI — Vegetation Control
2	UET20412	Certificate II in ESI — Transmission Structure and Line Assembly
2	UET20511	Certificate II in National Broadband Network Cabling (Electricity Supply Industry Assets)
2	UET20612	Certificate II in ESI — Asset Inspection
3	UET30512	Certificate III in ESI — Power Systems - Transmission Overhead
3	UET30612	Certificate III in ESI — Power Systems - Distribution

AQF Level	Qualification Code	Qualification Title
		Overhead
3	UET30712	Certificate III in ESI — Power Systems - Rail Traction
3	UET30812	Certificate III in ESI — Power Systems - Distribution Cable Jointing
3	UET30912	Certificate III in ESI — Remote Communities Utility Worker
4	UET40412	Certificate IV in ESI — Network Systems
4	UET40512	Certificate IV in ESI — Power Systems Substations
4	UET40612	Certificate IV in ESI — Power Systems Network Infrastructure
5	UET50212	Diploma of ESI - Power Systems
5	UET50312	Diploma of ESI - Power Systems Operations
6	UET60212	Advanced Diploma of ESI - Power Systems
6	UET60312	Advanced Diploma of ESI - Power Systems Operations

Table 2 — Qualifications Mapping of this Training Package UET12 - Version 2 to the former Training Package UET12 - Version 1

AQF Code	Diploma Qualifications (UET12 - V2)	Diploma Qualifications (UET12 – V1)	E = Equivalent N = Not Equivalent
UET50312	Diploma of ESI - Power Systems Oeprations	UET50109 Diploma of ESI - Power Systems	N

AQF Code	Advanced Diploma Qualifications (UET12 - V2)	Advanced Diploma Qualifications (UET12 – V1)	E = Equivalent N = Not Equivalent
UET60312	Advanced Diploma of ESI - Power Systems Operation	UET60109 Advanced Diploma of ESI - Power Systems	E

Table 3 — Qualifications Mapping of this Training Package UET12 -Version 1 to the former Training Package UET09 -Version 3

AQF Code	Certificate II Qualifications (UET12)	Certificate II Qualifications (UET09 – V3)	E = Equivalent N = Not Equivalent
UET20312	CII in ESI — Vegetation Control	UET20110 CII in ESI — Vegetation Control	E
UET20412	Certificate II in ESI — Transmission Structure and Line Assembly	UET20209 Certificate II in ESI — Transmission Line Assembly	E
UET20511	Certificate II in National Broadband Network Cabling (Electricity Supply Industry Assets)	Certificate II in National Broadband Network Cabling (Electricity Supply Industry Assets)	E
UET20612	CII in ESI — Assets Inspection	New Qualification	N

AQF Code	Certificate III Qualifications (UET12)	Certificate III Qualifications (UET09 – V3)	E = Equivalent N = Not Equivalent
UET30512	CIII in ESI — Power Systems - Transmission Overhead	UET30109 CIII in ESI —Transmission	E
UET30612	CIII in ESI — Power Systems - Distribution Overhead	UET30209 CIII in ESI —Distribution	E
UET30712	CIII in ESI — Power Systems - Rail Traction	UET30309 CIII in ESI —Rail Traction	E
UET30812	CIII in ESI — Power Systems - Distribution Cable Jointing	UET30409 CIII in ESI — Cable Jointing	E
UET30912	CIII in ESI — Remote Communities Utility Worker	New Qualification	N

AQF Code	Certificate IV Qualifications (UET12)	Certificate IV Qualifications (UET09 – V3)	E = Equivalent N = Not Equivalent
UET40412	CIV in ESI — Network Systems	UET40109 CIV in ESI —	E

AQF Code	Certificate IV Qualifications (UET12)	Certificate IV Qualifications (UET09 – V3)	E = Equivalent N = Not Equivalent
		Power Systems	
UET40512	CIV in ESI — Power Systems Substations	UET40209 CIV in ESI — Substation	E
UET40612	CIV in ESI — Power Systems Network Infrastructure	UET40309 CIV in ESI — Network Infrastructure	E

AQF Code	Diploma Qualifications (UET12)	Diploma Qualifications (UET09 – V3)	E = Equivalent N = Not Equivalent
UET50212	Diploma of ESI - Power Systems	UET50109 Diploma of ESI - Power Systems	E

AQF Code	Advanced Diploma Qualifications (UET12)	Advanced Diploma Qualifications (UET09 – V3)	E = Equivalent N = Not Equivalent
UET60212	Advanced Diploma of ESI - Power Systems	UET60109 Advanced Diploma of ESI - Power Systems	E

Table 4 — Mapping Qualifications UET09 Version 3 to UET09 Version 2.1

This Table maps the Electricity Supply Industry — Transmission and Distribution Sector Training Package (UET09) Version 2.0 to the revised Electricity Supply Industry — Transmission, Distribution and Rail Sector Training Package (UET09) Version 2.1.

Qual Code	Relates to	Nature of Relationship	E= Equivalent N – Not equivalent
UET20511	Certificate II in National Broadband Network Cabling (Electricity Supply Industry Assets)	New Qualification	

Table 5 — Mapping Qualifications UET09 Version 2.1 to UET09 Version 2.0

This Table maps the Electricity Supply Industry — Transmission and Distribution Sector Training Package (UET09) Version 2.0 to the revised Electricity Supply Industry — Transmission, Distribution and Rail Sector Training Package (UET09) Version 2.1.

Qual Code	Relates to	Nature of Relationship	E= Equivalent N – Not equivalent
UET20110	Certificate II in ESI — Vegetation Control.	Revised version of UET20109 to comply with NQC Packaging rules	E

Table 6 — Mapping Qualifications UET09 Version 2.0 to UET09 Version 1

This Table maps the Electricity Supply Industry — Transmission and Distribution Sector Training Package (UET09) Version 1 to the revised Electricity Supply Industry — Transmission, Distribution and Rail Sector Training Package (UET09) Version 2.0.

Qual Code	Relates to	Nature of Relationship	Equivalent — full, part or no
		No qualifications were amended or added in UET12 Version 2	

Table 7 — Mapping Qualifications UET09 Version 1 to UET06 Version 1

This Table maps the Electricity Supply Industry — Transmission and Distribution Sector Training Package (UET06) Version 1 to the revised Electricity Supply Industry — Transmission, Distribution and Rail Sector Training Package (UET09) Version 1.

Qual Code	Relates to	Nature of Relationship	Equivalent — full, part or no
UET20109	Certificate II in ESI — Vegetation Control.	Revised version of UET20106 – 1 imported unit replaced	Full
UET20209	Certificate II in ESI — Transmission Line Assembly.	Revised version of UET20206 – 1 imported unit replaced	Full
UET30109	CIII in ESI – Transmission	Revised version of UET30106 – 1 Unit removed from Core	Full
UET30209	Certificate III in ESI – Distribution	Revised version of UET30206 – 1 Unit removed from Core	Full
UET30309	Certificate III in ESI – Rail Traction	Revised version of UET30306 – 1 Unit removed from Core	Full
UET30409	Certificate III in ESI – Cable Jointing	Revised version of UET30406 – 1 Unit removed from Core	Full
UET40109	Certificate IV in ESI - Power Systems	Recoded as part of review	Full
UET40209	Certificate IV in ESI - Substation	Recoded as part of review	Full
UET40309	Certificate IV in ESI - Network Infrastructure	Recoded as part of review	Full
UET50109	Diploma of ESI — Power Systems	Restructured version of UET50106	Full
UET60109	Advanced Diploma of ESI — Power Systems	Restructured version of UET60106	Full

Table 8 — Mapping Qualifications

This Table maps the former Electricity Supply Industry — Transmission and Distribution Sector Training Package (UTT98) to the new Electricity Supply Industry — Transmission, Distribution and Rail Sector Training Package (UET06).

Qual Code	Relates to	Nature of Relationship	Equivalent — full, part or no
UET20106	Certificate II in ESI — Vegetation Control.	Previously resided in the National Electrotechnology Training Package UTE99 Completely new structure and units.	No equivalent
UET20206	Certificate II in ESI — Transmission Line Assembly.	New Qualification	No equivalent
UET30106	Certificate III in ESI — Transmission	Updated on the previous Certificate III in ESI — Transmission (Powerline) UTT30201— Completely new structure and units.	No equivalent
UET30206	Certificate III in ESI — Distribution	Updated on the previous Certificate III in ESI — Distribution (Powerline) UTT30101— Completely new structure and units.	No equivalent
UET30306	Certificate III in ESI — Rail Traction.	Updated on the previous Certificate III in ESI — Rail Traction (Powerline) UTT30401— Completely new structure and units.	No equivalent
UET30406	Certificate III in ESI — Cable Jointing.	Updated on the previous Certificate III in ESI — Cable Jointing (Powerline) UTT30301— Completely new structure and units.	No equivalent
UET40106	Certificate IV in ESI — Power Systems.	Updated on the previous qualifications with completely new structures and units. Certificate IV in ESI — Transmission (Powerline)	No equivalent

Qual Code	Relates to	Nature of Relationship	Equivalent — full, part or no
		UTT40101 Certificate IV in ESI — Distribution (Powerline) UTT40201	
UET40206	Certificate IV in ESI — Substation.	Certificate IV in ESI — Transmission and Distribution (Substations) UTT40301	No equivalent
UET40306	Certificate IV in ESI – Network Infrastructure	New Qualification	No equivalent
UET50106	Diploma of ESI — Power Systems.	New Qualification– Version 1	No equivalent
UET60106	Advanced Diploma of ESI — Power Systems.	New Qualification – Version 1	No equivalent

Summary of Units of Competency in the UET12 Version 1 Training Package

Table 9 – UET12 ESI – Transmission, Distribution and Rail Sector Training Package - Competency Standard Units

UNIT DISCIPLINE	UNIT CODE	No. of CSUs
Cable Jointing	CJ	15
Distribution	DP	6
Design	DS	28
Entry Level – Cross Discipline	EL	11
Industry Specific – Cross Discipline	IS	43
Refresher Training	RF	11
Rail Traction	RT	18

Substations	SB	18
Systems Operations	SO	20
Transmission	TP	15
Testing	TS	18
Vegetation	VC	12
Total CSUs		
Imported Units	N/A	110

Full details of the Competency Standards Units in this Training Package including: Unit Code, Title, Weighting Points, AQF Level, Pre-requisites and Qualification Mapping, are contained in the Index of Competency Standard Units, in Volume 1 Part 3 Competency Standards Index of this Training Package.

A mapping Competency Standard Units including the relationship between units which have been amended, added or deleted from versions of Transmission, Distribution and Rail Sector Training Package and equivalences is included in Volume 1 Part 3 Competency Standards Index of this Training Package.

Table 10 - Imported Units of Competency in the UET12 Training Package Version 1

Training Package	Training Package Title	Version	No. of Units
AHC10	Agriculture Horticulture, Conservation & Land Management	2	6
BSB07	Business Services Training Package	5	16
CPC08	Construction, Plumbing and Services Training Package	6	9
FPI11	Forest and Forest Products Training Package	2.2	1
HLT	Health Training Package	1.3	2
ICT10	Integrated Telecommunications Training Package	1	2
MEM05	Metal and Engineering Training Package	4	2
NWP07	Water Training Package	2	2
RII	Resources and Infrastructure Industry Training Package	1	3

TLI10	Transport and Logistics Training Package	1.1	10
UEE11	Electrotechnology Training Package	1.3	58
Total Imported CSUs			111

Full details of the Imported Units in this Training Package including: Unit Code, Title, Weighting Points, AQF Level, Pre-requisites and Qualification Mapping, are contained in the Index of Competency Standard Units in Volume 1 Part 3 Competency Standards Index of this Training Package.

Please consult the source Training Package for information, including equivalences, in relation to new and updated imported units included in this version of the Transmission, Distribution and Rail Sector Training Package.

Language, Literacy, Numeracy

The Competency Standards have been written to reflect the technical and operational needs of industry and include appropriate language and literacy requirements. A new and specific section related to literacy and numeracy skills has been included in the Competency Standard Units for the purposes of providing advice to RTOs on the entry requirements for each unit. It characterises how participants are to be best equipped to achieve the required, writing and numeracy skill levels.

A specific section for Literacy and Numeracy Skills and Employability Skills has been included in Volume 2 of this Training Package. In addition, there is an explanation of their relationship to the Performance Criteria and their assessment in accordance with the critical aspects of evidence within each Competency Standard Unit.

Access, Equity and Cultural Diversity

The skills required of employees in the ESI - Transmission, Distribution and Rail Industry sector of the EnergyUtilities Industry are comprehensive, with many employment opportunities available. The Competency Standards reflect the range of knowledge and skills and their application, required in the Industry. They are written in a non-exclusive manner so as to increase the participation rates of under-represented community groups and to minimise unintentional bias.

As a matter of policy in the ESI - Transmission, Distribution and Rail Industry and in this Training Package there is no exclusion of any persons from participating in competency development, training and employment. This includes encouraging under-represented groups such as indigenous peoples, people with disabilities, women, and people from rural and remote areas or cultural diversity to join the Industry.

Acknowledgments

The Board of Directors of the ElectroComms and Energy Utilities Industry Skills Council Ltd trading as EE-Oz Training Standards wishes to acknowledge the important developmental roles played by training advisory and delivery organisations, enterprises, employer and employee representatives, industry practitioners, regulatory authorities, individuals and community stakeholders. Without their level of commitment and support this Training Package would not exist in its current form. The Board acknowledges and thanks the following organisations and individuals:

- ESI - Transmission, Distribution and Rail Sector Training Package Training Advisory Group
- ESI - Transmission, Distribution and Rail Sector Training Package Review Technical Advisory Committees
- the Chairs, Executive Officers, and Members of the EE-Oz Training Standards State and Territory Network (ITABs) and their various sub-committees
- the State and Territory Training Authorities
- the State and Territory Regulatory Authorities
- industry sector RTOs and practitioners for contributing to and being supportive of the project
- industry sector practitioners for contributing to and being supportive of the project.

Outline of this Training Package

Outline of this Training Package

The endorsed components of the Training Package are contained in two volumes. Volume 1 covers the overall Package framework and completion requirements for qualifications, and Volume 2 the content details for respective parts and sub-sections of Volume 1. Both volumes form an integrated whole and are not to be used independently of each other.

Volume 1: Structure and Overview

Qualification Framework

This section describes how the qualifications, scope/descriptions, composition and content are structured. Completion and issuance requirements are provided as well as advice on flexibility arrangements, with entry and exit pathways and articulation arrangements. Titles and codes of the list of qualifications to be issued are also included.

Competency Standards

This section describes how the competency standards were developed (in broad terms), the industry coverage they apply to, as well as the format and construction of the individual Competency Standard Units. The index of Competency Standard Units and their scope/description is included in this part. Matters related to language, literacy and numeracy, access, equity and cultural diversity and regulatory arrangements, for which the Competency Standard Units may apply, is also included. The Definitions/Glossary and Essential Knowledge and Associated Skills sections of the Training Package link directly to the Competency Standard Units and no Unit is to be used in isolation or exported without these interrelated components.

Part 3 – Assessment Guidelines

This section outlines how the assessment guidelines inform a Registered Training Organisation (RTO) on the infrastructure requirements they will need to enable them to carry out training delivery assessment activities related to the Training Package. The guidelines include assessment systems, the role of RTOs, assessment pathways, recognition arrangements, assessor qualifications and sources of information.

Volume 2: Competency Standard Units — Content and scope

Volume 2 contains the Competency Standard Units in their respective disciplines. Volume 2 also contains the Essential Knowledge and Associated Skills, a Matrix mapping the essential knowledge and associated skills (EKAS) to the Unit and to the Definitions/Glossary section, which provides a description of relevant terms and vocabulary that appear in this Package. Also included are definitions relating to literacy and numeracy skills.

Note: The two volumes form an integrated whole and must not be used independently of each other.

Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package Layout

The revised Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package has been developed, reviewed and validated through extensive industry consultation. It reflects the views of a wide cross-section of the industry and its key stakeholders/practitioners throughout Australia.

The Training Package has been constructed as a two volume set. Volume 1 covers the overall package framework and completion requirements for qualifications. Volume 2 includes the content details of parts and sub-sections of Volume 1. The two volumes form an integrated whole and are not to be used independently of each other.

Volume 1

Preliminary Information

Current Membership of the National Transmission, Distribution and Rail Training Group

The Electricity Supply Industry

Part 1 Qualifications Framework

Part 2 Competency Standards Overview and Index

Part 3 Assessment Guidelines

Appendix A — New Apprenticeships

Appendix B — Sample Assessment Instruments

Enclosures

- Enclosure A: List of Sample Assessment Instruments
- Enclosure B: Administrative Forms
- Enclosure C: Glossary of Terms

Volume 2

Preliminary Information

Part 1 Definitions/Glossary

Part 2 Competency Standards

2.1 Competency Standard Units

Part Number	Discipline	Discipline Code
2.1.1	Cable Jointing Competency Standard Units	CJ
2.1.2	Distribution Competency Standard Units	DP
2.1.3	Design Competency Standard Units	DS
2.1.4	Entry Level Cross Discipline Competency Standard Units	EL
2.1.5	Industry Specific Cross Discipline Competency Standard Units	IS
2.1.6	Refresher Training Units	RF
2.1.7	Rail Traction Competency Standard Units	RT
2.1.8	Substation Competency Standard Units	SB

2.1.9	System Operations Competency Standard Units	SO
2.1.10	Transmission Competency Standard Units	TP
2.1.11	Testing Competency Standard Units	TS
2.1.12	Vegetation Competency Standard Units	VC
2.1.13	Imported Competency Standard Units	Own Code
2.1.15	Identified Skill Sets	N/A

2.2 Essential Knowledge and Associated Skills

Volume of: Knowledge and Associated Skills — Reference Codes and Reference Names
Table of Essential Knowledge and Skills to Unit Matrix
Part 3 Language, Literacy and Numeracy

Important Note to Users

Training Packages are not static documents; they are amended periodically to reflect the latest industry practices and are version controlled. It is essential that the latest version is always used.

Check the version number before commencing training or assessment

This Training Package is Version 1 – check whether this is the latest version by going to the National Training Information Service (www.ntis.gov.au) and locating information about the Training Package. Alternatively, contact EE-Oz Training Standards, www.ee-oz.com.au to confirm the latest version number.

Explanation of version number conventions

The primary release Training Package is Version 1. When changes are made to a Training Package, sometimes the version number is changed and sometimes it is not, depending on the extent of the change. When a Training Package is reviewed it is considered to be a new Training Package for the purposes of version control, and is Version 1. Do not confuse the version number with the Training Package's national code (which remains the same during its period of endorsement).

Explanation of the review date

The review date (shown on the title page and in the footer of each page) indicates when the Training Package is expected to be reviewed in the light of changes such as changing technologies and circumstances. The review date is not an expiry date. Endorsed Training Packages and their components remain current until they are reviewed or replaced.

1.0.00 Qualification Framework

Volume 1 Part 1

Qualification Framework

1.1.00 The Australian Qualification Framework

1.0 The Australian Qualification Framework

What is the Australian Qualifications Framework?

A brief overview of the Australian Qualifications Framework (AQF) follows. For a full explanation of the AQF, see the AQF Implementation Handbook.

http://www.aqf.edu.au/Portals/0/Documents/Handbook/AQF_Handbook_07.pdf

The AQF provides a comprehensive, nationally consistent framework for all qualifications in post-compulsory education and training in Australia. In the vocational education and training (VET) sector it assists national consistency for all trainees, learners, employers and providers by enabling national recognition of qualifications and Statements of Attainment.

Training Package qualifications in the VET sector must comply with the titles and guidelines of the AQF. Endorsed Training Packages provide a unique title for each AQF qualification which must always be reproduced accurately.

Qualifications

Training Packages can incorporate the following eight AQF qualifications:

- Certificate I in ...
- Certificate II in ...
- Certificate III in ...
- Certificate IV in ...
- Diploma of ...
- Advanced Diploma of ...
- Vocational Graduate Certificate of ...
- Vocational Graduate Diploma of ...

On completion of the requirements defined in the Training Package, a Registered Training Organisation (RTO) may issue a nationally recognised AQF qualification. Issuance of AQF qualifications must comply with the advice provided in the AQF Implementation Handbook and the AQTF 2011 Essential Standards for Initial and Continuing Registration.

Statement of Attainment

A Statement of Attainment is issued by a Registered Training Organisation when an individual has completed one or more units of competency from nationally recognised qualification(s)/courses(s). Issuance of Statements of Attainment must comply with the advice provided in the current AQF Implementation Handbook and the AQTF 2011 Essential Standards for Initial and Continuing Registration.

Under the AQTF 2011, RTOs must recognise the achievement of competencies as recorded on a qualification or Statement of Attainment issued by other RTOs. Given this, recognised competencies can progressively build towards a full AQF qualification.

AQF Guidelines and Learning Outcomes

The AQF Implementation Handbook provides a comprehensive guideline for each AQF qualification. A summary of the learning outcome characteristics and their distinguishing features for each VET related AQF qualification is provided below.

Certificate II

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and skills would prepare a person to perform in a range of varied activities or knowledge application where there is a clearly defined range of contexts in which the choice of actions required is usually clear and there is limited complexity in the range of operations to be applied.

Performance of a prescribed range of functions involving known routines and procedures and some accountability for the quality of outcomes.

Applications may include some complex or non-routine activities involving individual responsibility or autonomy and/or collaboration with others as part of a group or team.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate basic operational knowledge in a moderate range of areas;
- apply a defined range of skills;
- apply known solutions to a limited range of predictable problems;
- perform a range of tasks where choice between a limited range of options is required;
- assess and record information from varied sources;
- take limited responsibility for own outputs in work and learning

Certificate III

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and competencies would cover selecting, adapting and transferring skills and knowledge to Australian environments and providing technical advice and some leadership in resolution of specified problems. This would be applied across a range of roles in a variety of contexts with some complexity in the extent and choice of options available. Performance of a defined range of skilled operations, usually within a range of broader related activities involving known routines, methods and procedures, where some discretion and judgement is required in the selection of equipment, services or contingency measures and within known time constraints. Applications may involve some responsibility for others. Participation in teams including group or team coordination may be involved.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate some relevant theoretical knowledge
- apply a range of well-developed skills
- apply known solutions to a variety of predictable problems
- perform processes that require a range of well-developed skills where some discretion and judgement is required
- interpret available information, using discretion and judgement
- take responsibility for own outputs in work and learning
- take limited responsibility for the output of others

Certificate IV

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and competencies would cover a broad range of varied activities or application in a wider variety of contexts most of which are complex and non-routine. Leadership and guidance are involved when organising activities of self and others as well as contributing to technical solutions of a non-routine or contingency nature. Performance of a broad range of skilled applications including the requirement to evaluate and analyse current practices, develop Australian criteria and procedures for performing current practices and provision of some leadership and guidance to others in the application and planning of the skills. Applications involve responsibility for, and limited organisation of, others.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate understanding of a broad knowledge base incorporating some theoretical concepts

- apply solutions to a defined range of unpredictable problems
- identify and apply skill and knowledge areas to a wide variety of contexts, with depth in some areas
- identify, analyse and evaluate information from a variety of sources
- take responsibility for own outputs in relation to specified quality standards
- take limited responsibility for the quantity and quality of the output of others

Diploma

Characteristics of Learning Outcomes

Breadth, depth and complexity covering planning and initiation of alternative approaches to skills or knowledge applications across a broad range of technical and/or management requirements, evaluation and coordination.

The self directed application of knowledge and skills, with substantial depth in some areas where judgement is required in planning and selecting appropriate equipment, services and techniques for self and others.

Applications involve participation in development of strategic initiatives as well as personal responsibility and autonomy in performing complex technical operations or organising others. It may include participation in teams including teams concerned with planning and evaluation functions. Group or team coordination may be involved.

The degree of emphasis on breadth as against depth of knowledge and skills may vary between qualifications granted at this level.

Distinguishing Features of Learning Outcomes

Do the competencies or learning outcomes enable an individual with this qualification to:

- demonstrate understanding of a broad knowledge base incorporating theoretical concepts, with substantial depth in some areas
- analyse and plan approaches to technical problems or management requirements
- transfer and apply theoretical concepts and/or technical or creative skills to a range of situations
- evaluate information, using it to forecast for planning or research purposes
- take responsibility for own outputs in relation to broad quantity and quality parameters
- take some responsibility for the achievement of group outcomes

Advanced Diploma

Characteristics of Learning Outcomes

Breadth, depth and complexity involving analysis, design, planning, execution and evaluation across a range of technical and/or management functions including development of Australian

criteria or applications or knowledge or procedures. The application of a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts in relation to either varied or highly specific functions. Contribution to the development of a broad plan, budget or strategy is involved and accountability and responsibility for self and others in achieving the outcomes is involved. Applications involve significant judgement in planning, design, technical or leadership/guidance functions related to products, services, operations or procedures. The degree of emphasis on breadth as against depth of knowledge and skills may vary between qualifications granted at this level.

Distinguishing Features of Learning Outcomes

Do the competencies or learning outcomes enable an individual with this qualification to:

- demonstrate understanding of specialised knowledge with depth in some areas
- analyse, diagnose, design and execute judgements across a broad range of technical or management functions
- generate ideas through the analysis of information and concepts at an abstract level
- demonstrate a command of wide-ranging, highly specialised technical, creative or conceptual skills
- demonstrate accountability for personal outputs within broad parameters
- demonstrate accountability for personal and group outcomes within broad parameters

Regulatory Arrangements

Competency Standard Units, Skill Sets and Qualifications in this Training Package have been developed in consultation with the relevant industry technical and business Regulators so that, where appropriate, these align to the requirements of legislation, regulations and mandated codes of practice.

Licensing and regulatory authorities will recognise a range of Qualifications, Units or Skill Sets contained within this Training Package for respective licensing, registration or accreditation purposes. In constructing these qualifications, EE-Oz Training Standards and respective Regulators have given consideration to the link between the issuance of the qualification and the respective regulatory requirements. It is expected that the assessment and preferred training regime which meets the competency outcomes of the qualification and assessment, will therefore meet the regulatory requirements.

In recognising this interrelationship, every effort has been made to ensure currency in regulatory requirements, thus RTOs must ensure they are observed. This includes utilising any recommended industry training program designed to meet the Competency Standard Units and/or Qualification outcomes related to licensing/registration applications.

As RTO's registered under the Australian Quality Training Framework (AQTF) requirements are given full responsibility for deeming a learner/apprentice competent for the respective Competency Standard Units making up a Training Package Qualification or Skill Set, the RTO shall also provide all the necessary documentation (including results preferably percentile based) as required by the regulatory authority to support an application of eligibility for a relevant license, registration or accreditation.

It should be noted that regulatory authorities have advised that the quality of Registered Training Organisations issuing a qualification for regulatory purposes will be monitored. Where deficiencies are identified, regulators may deem it necessary to introduce appropriate actions, including an additional 'external' assessment following the issuing of the qualification to satisfy eligibility requirements for issuing the licence.

Exporting ESI - Transmission, Distribution and Rail Sector Industry CSUs from this Training Package

Competency Standard Units in this Training Package are interrelated and linked with the Definitions/Glossary and Essential Knowledge and Associated Skills sections of the Volume. This also includes information related to language, literacy and numeracy, access, equity, cultural diversity and any regulatory arrangements for which the Competency Standard Units may apply. No Competency Standard Unit can be used in isolation or exported without these interrelated components.

1.1.01 ESI - Transmission, Distribution and Rail Sector Qualification Framework

1.1 ESI – Transmission, Distribution and Rail Sector Qualification Framework

The qualifications listed in this Training Package adhere to the advice provided in the current version of AQF Implementation Handbook. See www.aqf.edu.au.

The qualifications have been designed to comply with the provisions of and comply with the National Quality Council's (NQC) requirements for Flexibility of Training Package Qualifications to include:

- One Third or more of total units required to gain a VET qualification will be electives.
- The choice of Elective units can be broadened, to allow one sixth of total units to be included from other qualifications in a Training Package, other Training Packages and accredited courses.
- All units as either core or electives.

See:http://www.nqc.tvetaustralia.com.au/__data/assets/pdf_file/0006/52269/National_Quality_Council_communique.pdf

It should be noted that under these provisions Licensed and trade occupations are exempt from these measures.

Application of the NQC Flexibility Formula

Industry has obtained formal agreement to the continued use of its unit weighting system for valuing individual competency standards and the effort required to achieve a qualification under these provisions.

Thus, for the qualifications in this Training Package, the terms "total units" and "total units required to gain a qualification" and the fractions thereof referred to above are calculated using the weighting points assigned to respective Competency Standard Units (CSU) rather than by a count of individual units. The Qualification Completion Requirements table below summarises the relevant weighting points values to satisfy the packaging rules of each qualification in accordance with the NQC Policy.

To allow for the inclusion of units imported from other qualifications and other Training Packages and accredited courses under this weighting points system, industry also gained agreement to the following process for importing and valuing such imported units, as follows:

- Customisation of these qualifications is permitted in order to meet learner's individual needs, their current, intended or future work context, and a variety of possible industry environments.
- For this purpose the importation of units up to one sixth of the total points value required for completion of a qualification is permitted from either one or a combination of the following three sources:
 - Elsewhere in this Training Package
 - Other Training Packages
 - Accredited Courses
- Units selected for importation under these provisions shall be first packaged in the source Training Package or Accredited Course at the AQF level of the target qualification.
- The importation of units from these sources shall be within the boundaries of the integrity of the intended qualification outcomes, the requirements of the Australian Qualifications Framework, the Australian Quality Training Framework and all regulatory requirements applicable to the imported unit and/or the target qualification.
- Minimum points (10) will be allocated to units imported from sources other than those managed by EE-Oz Training Standards. Advice on the valuation of units selected for importation from sources other than EE-Oz Training Packages shall be sought from the relevant EE-Oz Technical Advisory Committee.

Advice shall be sought from the relevant state/territory registration and accreditation body to determine if there is a requirement for an extension to a Registered Training Organisation's scope of registration in relation to the inclusion of such imported unit/s into a qualification. Advice shall be sought from the relevant registration and accreditation body regarding the requirement to record and report the inclusion of units imported under these provisions for the purposes of awarding a qualification.

Where units have been imported under these provisions, this shall be reported to EE-Oz Training Standards so that industry is aware of such units and can consider the endorsement of these into the relevant qualification(s).

Qualification Mapping

Please refer to Volume 1 Preliminary Information for:

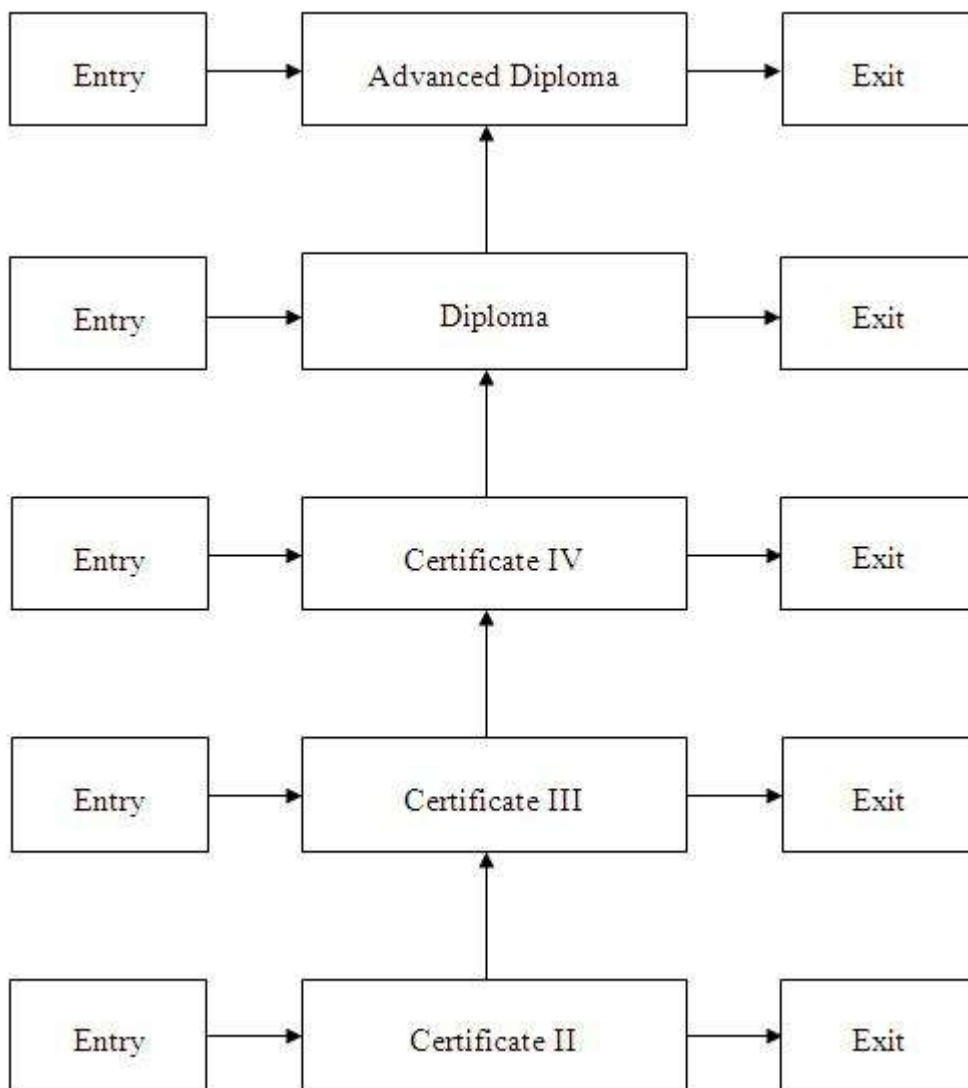
- Modifications History of Qualifications in this Training Package
- Mapping of the qualifications in this version of the ESI - Transmission, Distribution and Rail Sector Training Package to previous versions, including equivalences.

1.1.02 Qualification Pathways

1.2 Qualification Pathways

This Training Package provides open entry at each of the AQF levels. Arrows indicate the pathways that can be followed no matter at which qualification level you enter.

Entry and Exit Points for ESI – Transmission, Distribution and Rail Sector Industry Qualifications



For more information on the latest Training Package vocational standards qualifications and qualification pathways visit ElectroComms and EnergyUtilities Industry Skills Council Ltd trading as EE-Oz Training Standards at www.ee-oz.com.au

Articulation pathways

Qualification articulation and entry and exit arrangements are based on the specific training and education requirements endorsed by the industry. The construction of the Competency standard units and the group of units that make up an individual qualification are of particular significance to the operational, regulatory and safety arrangements of the industry. Each qualification provides a unique vocational outcome that can be used for Australian apprentices as entry-level contracted employees.

All qualifications are open entry and open exit and are available for use as Australian Apprenticeship entry-level contracted employment. Australian apprenticeship arrangements are subject to State/Territory statutory requirements, prescriptions within industrial instruments and policies of State/Territory training authorities and RTOs. Reference to what applies should therefore be made from respective statutory bodies in the first instance.

Australian Apprenticeship arrangements therefore apply to all qualifications; however, they are subject to State/Territory statutory requirements, prescriptions within industrial instruments and policies of State/Territory training authorities.

Open entry is provided into all qualifications, Open entry is available at all levels provided the prospective learner's general education and competency level is equivalent to the outcome of four to five years of secondary school. Additionally, entry levels provide an option for potential learners to choose a qualification suited to their needs while providing flexibility for recruitment action by employers. What must be satisfied for entry is that any listed prerequisite Competency Standard Unit requirements are met. Entry into all qualifications is also available through Recognised Prior Learning (RPL) arrangements.

School Based Australian Apprenticeships

Australian Apprenticeships are declared in each State or Territory according to the particular processes of the jurisdiction and requirements identified by industry in the State or Territory. Declarations for particular qualifications as either Traineeships or Apprenticeships are made accordingly and therefore the same qualification may be classified differently between jurisdictions.

Whilst EE-Oz has no control over these processes and declarations, it would recommend that the following qualifications be considered when addressing School based Australian Apprenticeships:

Qualification Code	Qualification Title
Nil	Nil

Access, Equity and Cultural Diversity

The skills required of employees in the ESI – Transmission, Distribution and Rail Sector are comprehensive. The qualifications in this Training Package reflect the range of competencies required and are written in a non-exclusive manner so as to increase the participation rates of all equity and disadvantaged groups and to minimise unintentional bias.

Language, Literacy and Numeracy

A specific section related to language, literacy and numeracy skills has been included in each Competency standard unit to provide advice on the entry requirements for each unit. It provides Registered Training Organisations (RTOs), industry and career aspirants with relevant language, literacy and numeracy entry-level advice for each Competency standard unit that would maximise an individual's prospects for successful completion of the unit and, where appropriate, the qualification.

The language, literacy and numeracy definitions and requirements are described in more detail in Volume 2, Part 3 — Language, Literacy and Numeracy Skills. Each Competency standard unit in Volume Part 2 references the respective language, literacy and numeracy skills that apply.

Australian Apprenticeship – Application

Australian Apprenticeships are work related competency programs designed for entry-level contracted employment for new entrants to the industry. For further information regarding Australian Apprenticeships and their application in relation to this Training Package refer to Appendix A - Australian Apprenticeship – application. Appendix A is located in Assessment Guidelines part 1.3.15

1.1.03 Qualification Employability Skills Statements

1.3 Qualification Employability Skills Statements

The Employability Skills facets for each AQF level are described below. These are broad industry requirements that may vary depending on qualification packaging rules and electives selected.

Employability Skills Summary for all Qualifications at AQF Level 2.

The following table contains a summary of the Employability Skills required by the ESI-Transmission, Distribution and Rail Industry for all UET12-Version 1 ESI-Transmission, Distribution and Rail Training Package qualifications at AQF level 2, namely;

Communication
Collect, organise and understand information related to the work task and it's relevant safety procedures
Communicate ideas and information to enable confirmation of work requirement and specifications
Co-operate with other workers/customers and report outcomes and/or any problems
Access, read and comprehend safety instructions and procedures
Share information via speech and in writing
Prepare time sheets
Teamwork
Work with others to generate and review ideas
Work effectively as an individual and as a member of a team
Work with others and in a team to identify work needs and review ideas against those needs
Relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities
Contribute to a positive culture of compliance within an organisation
Develop and maintain networks for the implementation and maintenance of industry knowledge, standards and requirements
Provide feedback

Problem Solving
Apply lateral thinking ideas to generate solutions in response to work problems
Anticipate or clarify problems to avoid interruptions to work flows and processes
Identify, assess and prioritise work risks to maintain efficiency, quality, productivity and work place safety at all times
Initiative & Enterprise
Identify and comply with all requirements and standards for work in the ESI-Transmission, Distribution and Rail industry
Apply enterprise best practice and quality systems
Interact effectively with both internal and external industry stakeholders
Initiate and follow through on the implementation of industry standards in the workplace
Planning & Organising
Plan and organise activities including the maintenance and layout of own worksite and obtain equipment and materials to avoid work flow interruptions or wastage
Identify related industry compliance requirements
Maintain relevant industry and work records
Establish clear implementation goals and deliverables
Collect, analyse and organise work task information
Apply time management prioritising techniques
Self Management
Plan own work within given task parameters
Set, monitor and satisfy personal work goals
Accept responsibility for given tasks
Apply systematic and effective time management
Learning
Satisfy the competency requirements for the job

Maintain current knowledge of tools, devices, instruments, materials, work practices and systems
Seek learning opportunities
Take control and manage own learning
Adopt a open approach to new ideas and techniques
Commit to and promote a culture of continuous learning
Set realistic learning goals for self development
Monitor and respond to learning process achievements
Technology
Use workplace technology related to the particular work tasks including tools, devices, instruments and materials
Attain and maintain required technical accreditation/authority under the industry standards
Attain and maintain IT skills relevant to the ESI-Transmission, Distribution and Rail industry
Be willing to gain knowledge and skills relevant to new and emerging technologies

The Employability Skills described above are representative of the ESI-Transmission, Distribution and Rail Industry in general and may not reflect enterprise specific requirements or job roles.

Learning and assessment strategies for each qualification should be based on the requirements of the units of competency comprising the qualification and the Assessment Guidelines, Volume 1, Part 3.

Employability Skills Summary for all Qualifications at AQF Level 3.

The following table contains a summary of the Employability Skills required by the ESI-Transmission, Distribution and Rail Industry for all UET12-Version 1 ESI-Transmission, Distribution and Rail Training Package qualifications at AQF level 3, namely;

Communication
Collect, organise and understand information related to the work task and it's relevant safety procedures
Communicate ideas and information to enable confirmation of work requirement and

specifications
Communicate information using drawing, diagrams, schedules and manuals
Communicate and/or report work outcomes and/or any problems
Communicate ideas, information and advice to co-workers/clients to enable confirmation of product/work requirements and specifications
Communicate effectively in oral and written form
Access, read and comprehend safety instructions and procedures
Collect, organise and understand information related to a work task and it's relevant safety procedures
Undertake negotiations if there are conflicts in work requirements and/or priorities
Share industry information
Document work quotations and tender support schedules
Prepare time sheets
Prepare documentation on particular work tasks including evaluations, reports, timesheets and costings
Prepare and present formal reports to clients and/or co-workers
Teamwork
Work with others to generate ideas and review
Work effectively as an individual and as a member of a team
Work with others and in a team to identify work needs and review ideas against those needs
Work with other and in a team to evaluate and report on work tasks and outcomes
Work with others and in a team to present information to a client and/or co-worker
Relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities
Influence individuals and teams
Develop and maintain networks for implementation and maintenance of industry standards in relation to workplace computer systems

Develop and maintain networks for the implementation and maintenance of industry knowledge, standards and requirements
Coach/mentor others and provide feedback
Problem Solving
Apply lateral thinking ideas to generate solutions in response to work problems
Apply operational research and research management skills
Clarify and identify work issues and apply processes to avoid interruptions to work flow/processes
Clarify problems and enterprise ideas to avoid interruptions to work flow/processes
Use testing techniques to anticipate or clarify problems to avoid interruptions to work flows and process
Generate ideas and alternatives
Analyse information to identify opportunities to develop solutions
Identify, assess and prioritise work risks to maintain efficiency, quality, productivity and work place safety at all times
Initiative & Enterprise
Recognise and respond to circumstances outside instructions or personal competence
Be proactive and apply strategies to overcome work blockages
Adopt proactive relationships with clients and co-workers
Identify and comply with all requirements and standards for work in the ESI-Transmission, Distribution and Rail industry
Apply enterprise best practice and quality systems
Generate ideas and translate into workplace actions and outcomes
Interact effectively with both internal and external industry stakeholders
Initiate and follow through on the implementation of the industry standards in the workplace
Translate ideas into action
Planning & Organising

Plan and organise activities including the maintenance and layout of own worksite and obtain equipment and materials to avoid work flow interruptions or wastage
Plan and organise activities to enable choices of maintenance methods of equipment, tools and related work documentation
Plan activities to enable choice of analysis/testing techniques of work outcomes and systems
Develop industry work plans including key performance indicators
Use mathematical ideas and techniques to correctly complete measurements, calculate quantities, estimate material, labour and overhead requirements and accurately cost the product/service
Use computing capabilities that enable the use of mathematical ideas and techniques to correctly complete measurements, calculate quantities, estimate material, labour and overhead requirements and accurately cost the product/service
Identify related industry compliance requirements
Identify, access and allocate required implementation resources
Maintain relevant industry and work records
Maintain relevant industry/work record systems
Maintain industry related records
Understand computer systems, their relationships and applications in the workplace
Establish clear implementation goals and deliverables
Monitor and optimise resource utilisation
Self Management
Plan own work within given task parameters
Set, monitor and satisfy personal work goals
Accept responsibility for given tasks
Clarify and confirm work instructions
Clarify own roles, goals, prerogatives and limitations in relation to the industry
Take responsibility for industry obligations

Evaluate and monitor own performance
Apply systematic and effective time management
Learning
Satisfy the competency requirements for the job
Maintain current knowledge of tools, devices, instruments, materials, work practices and systems
Seek learning opportunities
Provide technical instruction and learning assistance to assigned apprentices, trainees or other less experienced workers
Take control and manage own learning
Adopt a open approach to new ideas and techniques
Commit to and promote a culture of continuous learning
Set realistic learning goals for self development
Monitor and respond to learning process achievements
Technology
Use workplace technology to communicate with the client, document and present information
Use electronic information systems to communicate with co-workers and/or other related personnel
Use workplace technology related to the particular work tasks including tools, devices, instruments and materials
Use work place technology to collate, organise and maintain work documentation and information
Attain and maintain required technical accreditation/authority under the industry standards
Attain and maintain IT skills relevant to the ESI-Transmission, Distribution and Rail industry
Be willing to learn new IT skills
Be willing gain knowledge and skills relevant to new and emerging technologies

The Employability Skills described above are representative of the ESI-Transmission, Distribution and Rail Industry in general and may not reflect enterprise specific requirements or job roles.

Learning and assessment strategies for each qualification should be based on the requirements of the units of competency comprising the qualification and the Assessment Guidelines, Volume 1, Part 3.

Employability Skills Summary for all Qualifications at AQF Level 4.

The following table contains a summary of the Employability Skills required by the ESI-Transmission, Distribution and Rail Industry for all UET12-Version 1 ESI-Transmission, Distribution and Rail Training Package qualifications at AQF level 4, namely;

Communication
Collect, organise and understand information related to the work task and it's relevant safety procedures
Communicate ideas and information to enable confirmation of work requirement and specifications
Communicate information using drawing, diagrams, schedules and manuals
Communicate and/or report work outcomes and/or any problems
Communicate effectively in oral and written form
Access, read and comprehend safety instructions and procedures
Undertake negotiations if there are conflicts in work requirements and/or priorities
Share industry information
Share essential business information
Document work quotations and tender support schedules
Process approvals/authorities for industry activities
Prepare time sheets
Prepare documentation on particular work tasks including evaluations, reports, timesheets and costings
Prepare and present formal reports to clients and/or co-workers or other related personnel

Teamwork
Work with others by recognising dependencies and using co-operative approaches to optimise work flow and productivity
Work with others to generate ideas and review
Work effectively as an individual and as a member of a team
Work with others to identify work needs and review ideas against those needs
Work with others to evaluate and report on work tasks and outcomes
Work with others to present information to a client and/or co-worker(s)
Relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities
Influence individuals and teams
Develop and maintain networks for the implementation and maintenance of industry knowledge, standards and requirements
Coach/mentor others and provide feedback
Problem Solving
Use testing and analysis techniques to anticipate and/or clarify problems and plan around them to avoid interruptions to work flows/processes
Apply lateral thinking to generate solutions in response to work problems
Apply analytical techniques to anticipate design issues and product needs
Apply operational research and research management skills
Clarify and identify work issues and apply processes to avoid interruptions to work flow/processes
Analyse information to identify opportunities to develop solutions
Identify, assess and prioritise work risks to maintain efficiency, quality, productivity and work place safety at all times
Initiative & Enterprise
Recognise and respond to circumstances outside instructions or personal competence
Create new opportunities for the enterprise

Be proactive and apply strategies to overcome work blockages
Adopt a proactive relationship with clients/co-workers
Identify work needs by applying research techniques
Identify and comply with all requirements and standards for work in the ESI-Transmission, Distribution and Rail industry
Apply and enterprise best practice and quality systems
Apply and enterprise the best computer systems and applications to ensure quality and efficiency of work tasks and documentation
Generate ideas and translate into workplace actions and outcomes
Interact effectively with both internal and external industry stakeholders
Initiate and follow through on the implementation of industry standards in the workplace
Translate ideas into action
Planning & Organising
Plan and organise activities including the maintenance and layout of own worksite and obtain equipment and materials to avoid work flow interruptions or wastage
Plan and organise activities to enable choices of maintenance methods of equipment, tools and related work documentation
Plan activities to enable choice of analysis/testing techniques of work outcomes and systems
Plan and organise activities to enable the most appropriate testing/analysis procedures to be implemented
Plan activities to enable choice of the best computer systems/programs for application on a particular work task
Develop industry work plans including key performance indicators
Use mathematical ideas and techniques to correctly complete measurements, calculate quantities, estimate material, labour and overhead requirements and accurately cost the product/service
Use computing capabilities that enable the use of mathematical ideas and techniques to correctly complete measurements, calculate quantities, estimate material, labour and overhead requirements and accurately cost the product/service

Identify related industry compliance requirements
Identify, access and allocate required implementation resources
Maintain relevant industry and work records
Maintain relevant industry/work record systems
Maintain industry related records
Understand computer systems, their relationships and applications in the workplace
Establish clear implementation goals and deliverables
Monitor and optimise resource utilisation
Self Management
Plan own work within given task parameters
Maintain current knowledge of computer systems and capabilities
Set, monitor and satisfy personal work goals
Accept responsibility for given tasks
Clarify and confirm work instructions
Clarify own roles, goals, prerogatives and limitations in relation to the industry
Take responsibility for industry obligations
Evaluate and monitor own performance
Apply systematic and effective time management
Learning
Satisfy the competency requirements for the job
Maintain current knowledge of tools, devices, instruments, materials, work practices and systems
Maintain current knowledge of computer systems programs and there relevant applications
Seek learning opportunities
Provide technical instruction and learning assistance to assigned apprentices, trainees

or other less experienced workers
Take control and manage own learning
Adopt a open approach to new ideas and techniques
Commit to and promote a culture of continuous learning
Set realistic learning goals for self development
Monitor and respond to learning process achievements
Technology
Use workplace technology to document and present information
Use workplace technology to communicate with clients, co-workers and/or other related personnel
Use workplace technology related to particular work tasks including tools, equipment, devices, instruments and materials
Use workplace technology for data analysis/investigation
Attain and maintain required technical accreditation/authority under the industry standards
Attain and maintain IT skills relevant to the ESI-Transmission, Distribution and Rail industry
Be willing to learn new IT skills
Use workplace technology to collate, organise and maintain work documentation and information
Use computer applications as a management tool

The Employability Skills described above are representative of the ESI-Transmission, Distribution and Rail Industry in general and may not reflect enterprise specific requirements or job roles.

Learning and assessment strategies for each qualification should be based on the requirements of the units of competency comprising the qualification and the Assessment Guidelines, Volume 1, Part 3.

Employability Skills Summary for all Qualifications at AQF Level 5.

The following table contains a summary of the Employability Skills required by the ESI-Transmission, Distribution and Rail Industry for all UET12-Version 1 ESI-Transmission, Distribution and Rail Training Package qualifications at AQF level 5, namely;

Communication
Collect, organise and understand information related to the work task and it's relevant safety procedures
Communicate ideas and information to enable confirmation of work requirement and specifications
Communicate information using drawing, diagrams, schedules and manuals
Communicate and/or report work outcomes and/or any problems
Communicate effectively in oral and written form
Access, read and comprehend safety instructions and procedures
Undertake negotiations if there are conflicts in work requirements and/or priorities
Share industry information
Share essential business information
Document work quotations and tender support schedules
Process approvals/authorities for industry activities
Prepare time sheets
Prepare documentation on particular work tasks including evaluations, reports, timesheets and costings
Prepare and present formal reports to clients and/or co-workers or other related personnel
Use aesthetic ideas to plan visual presentation material
Teamwork
Work with others by recognising dependencies and using co-operative approaches to optimise work flow and productivity
Work with others to generate ideas and review
Work effectively as an individual and as a member of a team
Work with others to identify work needs and review ideas against those needs
Work with others to evaluate and report on work tasks and outcomes

Work with others to present information to a client and/or co-worker(s)
Relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities
Influence individuals and teams
Develop and maintain networks for the implementation and maintenance of industry knowledge, standards and requirements
Coach/mentor others and provide feedback
Problem Solving
Use testing and analysis techniques to anticipate and/or clarify problems and plan around them to avoid interruptions to work flows/processes
Apply lateral thinking to generate solutions in response to work problems
Apply analytical techniques to anticipate design issues and product needs
Apply operational research and research management skills
Apply contingency management techniques to variable circumstances
Clarify and identify work issues and apply processes to avoid interruptions to work flow/processes
Analyse information to identify opportunities to develop solutions
Identify, assess and prioritise work risks to maintain efficiency, quality, productivity and work place safety at all times
Initiative & Enterprise
Recognise and respond to circumstances outside instructions or personal competence
Create new opportunities for the enterprise
Be proactive and apply strategies to overcome work blockages
Adopt a proactive relationship with clients/co-workers
Identify work needs by applying research techniques
Identify and comply with all requirements and standards for work in the ESI-Transmission, Distribution and Rail industry
Apply and enterprise best practice and quality systems

Apply and enterprised the best computer systems and applications to ensure quality and efficiency of work tasks and documentation
Generate ideas and translate into workplace actions and outcomes
Interact effectively with both internal and external industry stakeholders
Initiate and follow through on the implementation of industry standards in the workplace
Translate ideas into action
Planning & Organising
Plan and organise activities including the maintenance and layout of own worksite and obtain equipment and materials to avoid work flow interruptions or wastage
Plan and organise activities to enable choices of maintenance methods of equipment, tools and related work documentation
Plan activities to enable choice of analysis/testing techniques of work outcomes and systems
Plan and organise activities to enable the most appropriate testing/analysis procedures to be implemented
Plan activities to enable choice of the best computer systems/programs for application on a particular work task
Develop industry work plans including key performance indicators
Use mathematical ideas and techniques to correctly complete measurements, calculate quantities, estimate material, labour and overhead requirements and accurately cost the product/service
Use computing capabilities that enable the use of mathematical ideas and techniques to correctly complete measurements, calculate quantities, estimate material, labour and overhead requirements and accurately cost the product/service
Identify related industry compliance requirements
Identify, access and allocate required implementation resources
Maintain relevant industry and work records
Maintain relevant industry/work record systems
Maintain industry related records

Understand computer systems, their relationships and applications in the workplace
Establish clear implementation goals and deliverables
Monitor and optimise resource utilisation
Self Management
Plan own work within given task parameters
Set, monitor and satisfy personal work goals
Accept responsibility for given tasks
Clarify and confirm work instructions
Clarify own roles, goals, prerogatives and limitations in relation to the industry
Take responsibility for industry obligations
Evaluate and monitor own performance
Apply systematic and effective time management
Learning
Satisfy the competency requirements for the job
Maintain current knowledge of tools, devices, instruments, materials, work practices and systems
Maintain current knowledge of computer systems programs and there relevant applications
Seek learning opportunities
Provide technical instruction and learning assistance to assigned apprentices, trainees or other less experienced workers
Take control and manage own learning
Adopt a open approach to new ideas and techniques
Commit to and promote a culture of continuous learning
Set realistic learning goals for self development
Monitor and respond to learning process achievements

Technology
Use workplace technology to document and present information
Use workplace technology to communicate with clients, co-workers and/or other related personnel
Use workplace technology related to particular work tasks including tools, equipment, devices, instruments and materials
Use workplace technology for data analysis/investigation
Attain and maintain required technical accreditation/authority under the industry standards
Attain and maintain IT skills relevant to the ESI-Transmission, Distribution and Rail industry
Be willing to learn new IT skills
Use workplace technology to collate, organise and maintain work documentation and information
Use computer applications as a management tool

The Employability Skills described above are representative of the ESI-Transmission, Distribution and Rail Industry in general and may not reflect enterprise specific requirements or job roles.

Learning and assessment strategies for each qualification should be based on the requirements of the units of competency comprising the qualification and the Assessment Guidelines, Volume 1, Part 3.

Employability Skills Summary for all Qualifications at AQF Level 6.

The following table contains a summary of the Employability Skills required by the ESI-Transmission, Distribution and Rail Industry for all UET12-Version 1 ESI-Transmission, Distribution and Rail Training Package qualifications at AQF level 6, namely;

Communication
Collect, organise and understand information related to the work task and it's relevant safety procedures
Communicate ideas and information to enable confirmation of work requirement and specifications

Communicate information using drawing, diagrams, schedules and manuals
Communicate and/or report work outcomes and/or any problems
Communicate effectively in oral and written form
Access, read and comprehend safety instructions and procedures
Undertake negotiations if there are conflicts in work requirements and/or priorities
Share industry information
Share essential business information
Share essential IT/Computing information
Document work quotations and tender support schedules
Process approvals/authorities for industry activities
Prepare documentation on particular work tasks including evaluations, reports, timesheets and costings
Prepare and present formal reports to clients and/or co-workers or other related personnel
Use aesthetic ideas to plan visual presentation material
Teamwork
Work with others by recognising dependencies and using co-operative approaches to optimise work flow and productivity
Work with others to generate ideas and review
Work effectively as an individual and as a member of a team
Work with others to identify work needs and review ideas against those needs
Work with others to evaluate and report on work tasks and outcomes
Work with others to present information to a client and/or co-worker(s)
Relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities
Influence individuals and teams
Develop and maintain networks for the implementation and maintenance of industry

knowledge, standards and requirements
Coach/mentor others and provide feedback
Problem Solving
Use testing and analysis techniques to anticipate and/or clarify problems and plan around them to avoid interruptions to work flows/processes
Apply lateral thinking to generate solutions in response to work problems
Apply analytical techniques to anticipate design issues and product needs
Apply operational research and research management skills
Apply contingency management techniques to variable circumstances
Clarify and identify work issues and apply processes to avoid interruptions to work flow/processes
Analyse information to identify opportunities to develop solutions
Identify, assess and prioritise work risks to maintain efficiency, quality, productivity and work place safety at all times
Initiative & Enterprise
Recognise and respond to circumstances outside instructions or personal competence
Create new opportunities for the enterprise
Be proactive and apply strategies to overcome work blockages
Adopt a proactive relationship with clients/co-workers
Identify work needs by applying research techniques
Identify and comply with all requirements and standards for work in the ESI-Transmission, Distribution and Rail industry
Apply and enterprise best practice and quality systems
Apply and enterprise the best computer systems and applications to ensure quality and efficiency of work tasks and documentation
Generate ideas and translate into workplace actions and outcomes
Interact effectively with both internal and external industry stakeholders
Initiate and follow through on the implementation of industry standards in the

workplace
Translate ideas into action
Planning & Organising
Plan and organise activities including the maintenance and layout of own worksite and obtain equipment and materials to avoid work flow interruptions or wastage
Plan and organise activities to enable choices of maintenance methods of equipment, tools and related work documentation
Plan activities to enable choice of analysis/testing techniques of work outcomes and systems
Plan and organise activities to enable the most appropriate testing/analysis procedures to be implemented
Plan activities to enable choice of the best computer systems/programs for application on a particular work task
Develop industry work plans including key performance indicators
Use mathematical ideas and techniques to correctly complete measurements, calculate quantities, estimate material, labour and overhead requirements and accurately cost the product/service
Use computing capabilities that enable the use of mathematical ideas and techniques to correctly complete measurements, calculate quantities, estimate material, labour and overhead requirements and accurately cost the product/service
Identify related industry compliance requirements
Identify, access and allocate required implementation resources
Maintain relevant industry and work records
Maintain relevant industry/work record systems
Maintain industry related records
Understand computer systems, their relationships and applications in the workplace
Understand business systems and their relationships
Establish clear implementation goals and deliverables
Monitor and optimise resource utilisation

Self Management
Plan own work within given task parameters
Set, monitor and satisfy personal work goals
Accept responsibility for given tasks
Clarify and confirm work instructions
Clarify own roles, goals, prerogatives and limitations in relation to the industry
Take responsibility for industry obligations
Evaluate and monitor own performance
Apply systematic and effective time management
Learning
Satisfy the competency requirements for the job
Maintain current knowledge of tools, devices, instruments, materials, work practices and systems
Maintain current knowledge of computer systems programs and there relevant applications
Seek learning opportunities
Provide technical instruction and learning assistance to assigned apprentices, trainees or other less experienced workers
Take control and manage own learning
Adopt a open approach to new ideas and techniques
Commit to and promote a culture of continuous learning
Set realistic learning goals for self development
Monitor and respond to learning process achievements
Technology
Use workplace technology to document and present information
Use workplace technology to communicate with clients, co-workers and/or other related personnel

Use workplace technology related to particular work tasks including tools, equipment, devices, instruments and materials
Use workplace technology for data analysis/investigation
Attain and maintain required technical accreditation/authority under the industry standards
Attain and maintain IT skills relevant to the ESI-Transmission, Distribution and Rail industry
Be willing to learn new IT skills
Use workplace technology to collate, organise and maintain work documentation and information
Use computer applications as a management tool

The Employability Skills described above are representative of the ESI-Transmission, Distribution and Rail Industry in general and may not reflect enterprise specific requirements or job roles.

Learning and assessment strategies for each qualification should be based on the requirements of the units of competency comprising the qualification and the Assessment Guidelines, Volume 1, Part 3.

1.1.04 Qualifications Scopes

1.4 Qualification Scopes

The qualifications described in this section of the Training Package have been designed and structured by industry in consultation with a range of stakeholders including regulators, RTOs and the community. They address identified work functions and work environments and facilitate worthwhile career pathways within the industry.

The qualification structures that follow must be read in conjunction with Part 1.2.03 — Competency Standards, Unit Construction.

Certificate II

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and skills would prepare a person to perform in a range of varied activities or knowledge application where there is a clearly defined range of contexts in which the choice of actions required is usually clear and there is limited complexity in the range of operations to be applied.

Performance of a prescribed range of functions involving known routines and procedures and some accountability for the quality of outcomes.

Applications may include some complex or non-routine activities involving individual responsibility or autonomy and/or collaboration with others as part of a group or team.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate basic operational knowledge in a moderate range of areas
- apply a defined range of skills
- apply known solutions to a limited range of predictable problems
- perform a range of tasks where choice between a limited range of options is required
- assess and record information from varied sources
- take limited responsibility for own outputs in work and learning.

Qualification title: Certificate II in ESI — Powerline Vegetation Control UET20312

Description of the qualification

Those gaining this qualification will be able to control the growth of vegetation near powerlines. Encompassed is compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines / Codes of Practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

Typical work function	Typical work environment

Typical work function	Typical work environment
<p>Preparation of risk assessment control measures that encompass job safety assessment.</p> <p>Identifications of broad environmental values of sites, potential hazards, consultation and notification processes associated with sites and categorisation of sites as per legislative and regulatory codes.</p> <p>Assessment of trees for defects and hazards prior to climbing, preparation of climbing equipment and understand aerial emergency rescue procedures.</p> <p>Options available:</p> <ul style="list-style-type: none"> • Working from an elevated platform: determine trees natural lean, remove obstructions within the fall zone, determine felling methods, access trees to install restraints, remove trees in a safe manner and clear debris from felling site. • Working from the ground only: determine trees natural lean, remove obstructions within the fall zone, determine felling methods, access trees to install restraints, remove trees in a safe manner and clear debris from felling site. • Prepare and maintain equipment, operate equipment (e.g. EWP, woodchipper), remove stumps, control traffic. 	<p>Urban and rural worksites.</p> <p>Outside work at commercial and industrial premises, such as assets owners in the Electricity Supply Industry.</p>

Qualification title: Certificate II in ESI — Transmission Structure and Line Assembly UET20412

Description of the qualification

Those gaining this qualification will be able to assembly transmission towers and structures and stringing transmission overhead conductors prior to them being tensioned.

Typical work function	Typical work environment
<p>Erection of transmission towers and hardware used on towers and the pre-tension stringing of conductors.</p> <p>The establishment and reinstatement of the transmission tower worksite such as basic excavation work will require the use of support plant and equipment which may include back hoes, earth drilling rigs, trench excavators, heavy vehicles, wood-chippers, concrete cutters, rollers and compactor, trenching equipment and drills.</p> <p>Environmental concerns play a major part in this job</p>	<p>Outside work associated with transmission tower asset owners and the transmission tower construction industry.</p>

function.	
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Qualification title: Certificate II in National Broadband Network Cabling (Electricity Supply Industry Assets) UET20511

Description of the qualification

This qualification provides competencies to support the installation of national broadband network cabling on electricity supply industry assets following prescribed procedures and installation processes.

Typical work function	Typical work environment
<p>Erection and maintenance of NBN network cabling (backbone infrastructure) including hardware used for installation of cabling and cable supports in both underground and aerial (communications corridor) environments. The stringing of cable. The establishment and reinstatement of the worksite such as basic excavation work will require the use of support plant and equipment which may include elevating work platforms. The documentation of OHS hazards and risks and the application of OHS practices, particularly in relation to working near live electrical apparatus are essential to this role.</p> <p>Local traffic control, working at heights and/or in confined spaces, splicing and termination of optical fibre cable and installation a telecommunications service to a building and solving problems in d.c. and data and voice circuits may form part of this job role.</p> <p>Addressing environmental concerns play a major part in this job function.</p>	<p>Outside work associated with the construction and maintenance of National Broadband Network Cabling</p>

Certificate III

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and competencies would cover selecting, adapting and transferring skills and knowledge to new environments and providing technical advice and some leadership in resolution of specified problems. This would be applied across a range of roles in a variety of contexts with some complexity in the extent and choice of options available.

Performance of a defined range of skilled operations, usually within a range of broader related activities involving known routines, methods and procedures, where some discretion and judgement is required in the selection of equipment, services or

contingency measures and within known time constraints.

Applications may involve some responsibility for others. Participation in teams including group or team co-ordination may be involved.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate some relevant theoretical knowledge
- apply a range of well-developed skills
- apply known solutions to a variety of predictable problems
- perform processes that require a range of well-developed skills where some discretion and judgement is required
- interpret available information, using discretion and judgement
- take responsibility for own outputs in work and learning
- take limited responsibility for the output of others.

Qualification title: Certificate III in ESI — Power Systems – Transmission Overhead UET30512

Description of the qualification

Those gaining this qualification will be able to acquire the skills and knowledge needed for a career in power line transmission industry.

Typical work function	Typical work environment
Erection of towers, poles, structures and associated hardware including the installation and maintenance of conductors and cables. Inspection procedures for overhead structures and electrical apparatus are also included.	Outside work, assembling transmission towers and stringing and connecting transmission lines.

Qualification title: Certificate III in ESI — Power Systems – Distribution Overhead UET30612

Description of the qualification

Those gaining this qualification will be able to acquire the skills and knowledge needed for a career in power line distribution industry.

Typical work function	Typical work environment
Install, maintain and inspect poles, structures and associated hardware used on poles and structures. The work also encompasses the installation and maintenance of electrical equipment, conductors and cables used in the powerline industry. The use of support plant and equipment to undertake these tasks and environmental concerns also play a part in this job	Outside work, installing poles and structures and associated equipment, stringing overhead lines and cables.

function.	
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Qualification title: Certificate III in ESI — Power Systems - Rail Traction UET30712

Description of the qualification

Those gaining this qualification will be able to acquire the skills and knowledge needed for a career in the tram and train overhead powerline sector of the Rail Industry.

Typical work function	Typical work environment
Installation, maintenance and inspection of overhead poles/structures, conductors and cables and rail traction wiring systems including associated equipment used on these structures. The installation and maintenance of the overhead traction configuration and the installation and maintenance of bonds as well as the operation of the rail traction height access equipment is also included in this job function.	Outside work, installing rail structures and associated equipment, stringing overhead lines and cables associated with the trams and trains

Qualification title: Certificate III in ESI — Power Systems – Distribution Cable Jointing UET30812

Description of the qualification

Those gaining this qualification will be able to acquire the skills and knowledge needed for a career as a cable jointer in the Distribution and Rail sectors of the Electricity Supply Industry.

Typical work function	Typical work environment
Laying, installation and maintenance of de-energised LV and HV underground polymeric cables and the installation and maintenance of electrical equipment. Options are available for skills to be obtained for energised cables and or Low and High Voltage paper insulated cables.	Outside work, installing underground cables and associated equipment for the distribution and rail industry

Qualification title: Certificate III in ESI — Remote Communities Utility Worker UET30912

Description of the qualification

Those gaining this qualification will be able to acquire the skills and knowledge needed for a career in inspecting and maintaining essential public utilities (excludes mine sites) within Very Remote Communities.

All work on essential electrical utilities will be undertaken in a non-energised (Dead) environment other than for testing purposes.

The use of support plant and equipment to undertake these tasks and environmental concerns also play a part in this job function.

Typical work function	Typical work environment
<p>Maintaining essential public utilities assets such as poles, structures, associated hardware and generating plant. The work also encompasses maintenance of electrical equipment, conductors and cables used in the generation and distribution of electrical energy. The use of support plant and equipment to undertake these tasks and environmental concerns also play a part in this job function.</p>	<p>Outside work, maintaining generating plant, distribution poles and structures and associated equipment, underground cables.</p>

Certificate IV

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and competencies would cover a broad range of varied activities or application in a wider variety of contexts most of which are complex and non-routine. Leadership and guidance are involved when organising activities of self and others as well as contributing to technical solutions of a non-routine or contingency nature.

Performance of a broad range of skilled applications including the requirement to evaluate and analyse current practices, develop new criteria and procedures for performing current practices and provision of some leadership and guidance to others in the application and planning of the skills.

Applications involve responsibility for, and limited organisation of, others.

Distinguishing Features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate understanding of a broad knowledge base incorporating some theoretical concepts
- apply solutions to a defined range of unpredictable problems
- identify and apply skill and knowledge areas to a wide variety of contexts, with depth in some areas
- identify, analyse and evaluate information from a variety of sources
- take responsibility for own outputs in relation to specified quality standards
- take limited responsibility for the quantity and quality of the output of others.

Qualification title: Certificate IV in ESI — Network Systems UET40412

Description of the qualification

Those gaining this qualification will be able to acquire additional skills and knowledge needed for a career in one of four specific fields, namely, Live Line Transmission, Live Line Distribution, Live Line Rail Traction and or installation and maintenance of Specialised Underground Cables.

Typical work function	Typical work environment
<p>Live Line Transmission</p> <p>Maintenance of energised transmission overhead lines using the stick technique, barehand technique and using barehand technique on a helicopter platform.</p> <p>Live Line Distribution</p> <p>Maintenance of energised distribution overhead lines using the stick technique and the glove and barrier technique.</p> <p>Live Line Rail Traction</p> <p>Maintenance of energised rail traction overhead wiring system and lines using the stick technique and the glove and barrier technique.</p> <p>Specialised Underground Cables</p> <p>Installation and maintenance of oil and gas filled specialised underground cables, installation and maintenance of polymeric specialised underground cable and the installation and maintenance of oil and gas pressure systems for specialised underground cables.</p>	<p>Work associated with the installation and maintenance of transmission, distribution, rail and or cable jointing overhead and or underground lines and cables which may be live.</p>

Qualification title: Certificate IV in ESI — Power Systems Substations UET40512

Description of the qualification

Those gaining this qualification will be able to acquire skills and knowledge needed for a career in installation and maintenance of substations.

Typical work function	Typical work environment
<p>Substation work associated with the maintenance of HV power system, including circuit breakers and transformers. It encompasses the carrying out of substation, switching, inspection, and the diagnosing and rectification of faults. Options are available for skills to be obtained in High Current DC switchgear and equipment, installation of HV plant and equipment and or the maintenance and commissioning</p>	<p>Working on Substations associated with Transmission, Distribution and Rail sectors of the Electricity Supply Industry.</p>

of discrete protection and control systems.	
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Qualification title: Certificate IV in ESI — Power Systems Network Infrastructure UET40612

Description of the qualification

Those gaining this qualification will be able to acquire skills and knowledge needed for a career in installation and maintenance of network infrastructure in one of four specific fields, namely, Transmission, Distribution, Rail Traction or Cable Jointer in the Distribution and Rail sectors of the Electricity Supply Industry.

Typical work function	Typical work environment
<p>Installation and maintenance of apparatus and equipment belonging to electricity suppliers.</p> <p>Transmission</p> <p>Erection of towers, poles, structures and associated hardware including the installation and maintenance of conductors and cables. Inspection procedures for overhead structures and electrical apparatus are also included.</p> <p>Distribution</p> <p>Install, maintain and inspect poles, structures and associated hardware used on poles and structures. The work also encompasses the installation and maintenance of electrical equipment, conductors and cables used in the powerline industry. The use of support plant and equipment to undertake these tasks and environmental concerns also play a part in this job function.</p> <p>Rail Traction</p> <p>Installation, maintenance and inspection of overhead poles/structures, conductors and cables and rail traction wiring systems including associated equipment used on these structures. The installation and maintenance of the overhead traction configuration and the installation and maintenance of bonds as well as the operation of the rail traction height access equipment is also included in this job function.</p> <p>Cable Jointing</p> <p>Laying, installation and maintenance of de-energised LV and HV underground polymeric cables and the installation and maintenance of electrical equipment.</p>	<p>Outside work, associated with the installation and maintenance of network infrastructure for transmission, distribution, rail and or cable jointing overhead and or underground lines and cables which may be live.</p> <p>Industrial workshops, substations, switchyards and premises pertaining to the electricity supplier.</p>

Typical work function	Typical work environment
Options are available for skills to be obtained for energised cables and or Low and High Voltage paper insulated cables.	

Diploma

Characteristics of Learning Outcomes

Breadth, depth and complexity covering planning and initiation of alternative approaches to skills or knowledge applications across a broad range of technical and/or management requirements, evaluation and co-ordination.

The self directed application of knowledge and skills, with substantial depth in some areas where judgement is required in planning and selecting appropriate equipment, services and techniques for self and others.

Applications involve participation in development of strategic initiatives as well as personal responsibility and autonomy in performing complex technical operations or organising others. It may include participation in teams including teams concerned with planning and evaluation functions. Group or team co-ordination may be involved.

The degree of emphasis on breadth as against depth of knowledge and skills may vary between qualifications granted at this level.

Distinguishing Features of Learning Outcomes

Do the competencies or learning outcomes enable an individual with this qualification to:

- demonstrate understanding of a broad knowledge base incorporating theoretical concepts, with substantial depth in some areas
- analyse and plan approaches to technical problems or management requirements
- transfer and apply theoretical concepts and/or technical or creative skills to a range of situations
- evaluate information, using it to forecast for planning or research purposes
- take responsibility for own outputs in relation to broad quantity and quality parameters
- take some responsibility for the achievement of group outcomes.

Qualification title: Diploma of ESI — Power Systems UET50212

Description of the qualification

Those gaining this qualification will be able to acquire skills and knowledge needed for a career in either, design, protection/testing and or system operation.

Typical work function	Typical work environment
<p>OHS and EPA management systems and options in three specific streams:</p> <p>Design</p> <p>Preparation and management of detail construction plans for electrical system infrastructure, designing overhead, underground, substations and or public lighting systems. Development of planned outages strategies and or the investigation of quality supply issues.</p> <p>Protection/Testing</p> <p>Testing, maintaining and commissioning metering schemes and or distribution field devices, maintaining and commissioning network protection and control systems (interdependent) and, installing and maintaining power systems communication equipment.</p> <p>System Operation</p> <p>Development of LV and HV distribution switching programs and transmission switching programs. Coordinate LV distribution networks and HV distribution and subtransmission networks.</p>	<p>Designing new transmission, distribution and or rail overhead and underground lines for the Electricity Supply Industry. Typically inside work in design/drafting facilities</p> <p>Testing transmission, distribution and or rail overhead and underground lines and equipment for the Electricity Supply Industry. Typically outside and inside work.</p> <p>System Operations- Control rooms in an industrial complex with mimic panels, video displays, chart recorders, computers switching controls.</p>

Qualification title: Diploma of ESI — Power Systems Operations UET50312

Description of the qualification

Those gaining this qualification will be able to acquire additional skills and knowledge needed for a career in system operation.

Typical work function	Typical work environment
<p>OHS and EPA management systems in a systems operations environment including the development of LV and HV distribution switching programs and transmission switching programs. Coordinate LV distribution networks and HV distribution and subtransmission networks.</p>	<p>System Operations- Control rooms in an industrial complex with mimic panels, video displays, chart recorders, computers switching controls.</p>

Advanced Diploma

Characteristics of Learning Outcomes

Breadth, depth and complexity involving analysis, design, planning, execution and evaluation across a range of technical and/or management functions including development of new criteria or applications or knowledge or procedures.

The application of a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts in relation to either varied or highly specific functions. Contribution to the development of a broad plan, budget or strategy is involved and accountability and responsibility for self and others in achieving the outcomes is involved.

Applications involve significant judgement in planning, design, technical or leadership/guidance functions related to products, services, operations or procedures.

The degree of emphasis on breadth as against depth of knowledge and skills may vary between qualifications granted at this level.

Distinguishing Features of Learning Outcomes

Do the competencies or learning outcomes enable an individual with this qualification to:

- demonstrate understanding of specialised knowledge with depth in some areas
- analyse, diagnose, design and execute judgements across a broad range of technical or management functions
- generate ideas through the analysis of information and concepts at an abstract level
- demonstrate a command of wide-ranging, highly specialised technical, creative or conceptual skills
- demonstrate accountability for personal outputs within broad parameters
- demonstrate accountability for personal and group outcomes within broad parameters.

Qualification title: Advanced Diploma of ESI — Power Systems UET60212

Description of the qualification

Those gaining this qualification will be able to acquire additional skills and knowledge needed for a career in either, design, testing and or system operation.

Typical work function	Typical work environment
<p>OHS and EPA management systems and options in three specific streams:</p> <p>Design</p> <p>Preparation and management of detail construction plans for electrical system infrastructure and the</p>	<p>Higher level, managerial design, protection/testing and system operation functions. Typically inside or outside environment of the Transmission, Distribution</p>

Typical work function	Typical work environment
<p>designing of customer substations, Analysis and appraisal of fault and outage data, the designing of overhead and underground transmission systems and or the review of asset management strategies</p> <p>Protection/Testing</p> <p>Maintaining network protection control systems, conducting of evaluation of primary plant, conducting evaluations of power systems faults and or undertaking project management of substation augmentation and maintenance.</p> <p>System Operation</p> <p>Management of HV distribution and subtransmission and or transmission network demand. Development of crisis management plans, management of network faults, critical events and or control of generating plant.</p>	<p>and Rail sectors of the Electricity Supply Industry.</p>

Qualification title: Advanced Diploma of ESI — Power Systems Operation UET60312

Description of the qualification

Those gaining this qualification will be able to acquire skills and knowledge needed for a career in system operation.

Typical work function	Typical work environment
<p>OHS and EPA management systems in a systems operations environment including the development of LV and HV distribution switching programs and transmission switching programs. Coordinate LV distribution networks and HV distribution and subtransmission networks.</p> <p>.</p>	<p>Higher level, managerial system operation functions. Typically inside or outside environment of the Transmission, Distribution and Rail sectors of the Electricity Supply Industry.</p>

1.1.05 Qualifications and Packaging Rules

1.5 Qualifications and Packaging Rules

The following table details the full range of qualifications in this version of the ESI – Transmission, Distribution and Rail Sector Training Package, the completion requirements for each qualification and their respective structure and composition. These qualifications have been designed to comply with the National Quality Council’s Packing Rules for Flexibility initiative.

Each qualification is described by the number of core and elective weighted points required for completion and issue of the qualification under the AQF.

Respective qualifications have at least two Elective Groups from which elective competencies may be drawn. Where a range of weighting points is set for a group e.g. 60-120, the lower number indicates both the minimum weighting points required from that particular elective group for completion and the larger number is the maximum required weighting points which may be selected from that group for a valid qualification completion.

Where the lower number for a group is 0 no competencies are required to be selected from that group, however, sufficient weighted points must be selected from other groups to meet the required total elective weighted points for completion.

Note: Individuals may select elective units to a weighting point total greater than the maximum specified for completion from a particular group. Where this is done weighted points in excess of the specified maximum cannot be counted for completion of the qualification.

Where a Competency Standard Unit has pre-requisite Competency Standards Unit requirements, such pre-requisite units shall be completed and their weighted points counted toward qualification completion.

Full details of each qualification follow Table 1 -Qualification Completion Values, below.

Table 1 – Qualification Completion Values

Qualification Code	Qualification Title	Total Core	Total Elective	Elective Units Groups				
				Group A	Group B	Group C	Group D	Group E

UET20312	Certificate II in ESI — Vegetation Control	240	120	0-70	50-120			
UET20412	Certificate II in ESI — Transmission Structure and Line Assembly	160	200	0-60	140-200			
UET20511	Certificate II in National Broadband Network Cabling (Electricity Supply Industry Assets)	240	120	0-60	60-120			
UET20612	Certificate II in ESI — Assets Inspection	220	140	0-60	80-140			

UET30512	Certificate III in ESI — Power Systems - Transmission Overhead	840	220	0-60	160-220			
UET30612	Certificate III in ESI — Power Systems - Distribution Overhead	920	140	0-60	80-140			
UET30712	Certificate III in ESI — Power Systems - Rail Traction	870	190	0-60	130-190			
UET30812	Certificate III in ESI — Power Systems - Distribution Cable Jointing	780	280	0-60	220-280			
UET30912	Certificate III in ESI — Remote Communities Utility Worker	700	360	0-180	180-360			
UET40412	Certificate IV in ESI — Network Systems	540	740	0-60	0-420	320-740		
UET40512	Certificate IV in ESI — Power Systems Substations	1030	250	0-50	0-120	130-250		
UET40612	Certificate IV in ESI — Power Systems Network Infrastructure	940	340	0-50	0-140	200-340		

UET50212	Diploma of ESI - Power Systems	700	900	0-270	0-400	0-200	140-900	
UET50312	Diploma of ESI - Power Systems Operations	850	750	0-270	0-360	0-200	190-750	
UET60212	Advanced Diploma of ESI — Power Systems	820	1340	0-360	0-400	0-200	140-900	440-1200
UET60312	Advanced Diploma of ESI — Power Systems Operations	970	1090	0-360	0-360	0-200	140-650	440-950

1.1.06 Skill Sets

1.6 Skill Sets

Definition

Skill sets are defined as single units of competency, or combinations of units of competency from an endorsed Training Package, which link to a licence or regulatory requirement, or defined industry need.

Skill sets are a way of publicly identifying logical groupings of units of competency which meet an identified need or industry outcome. Skill sets are not qualifications.

Where skill sets are identified in a Training Package, the Statement of Attainment can set out the competencies a person has achieved in a way that is consistent and clear for employers and others. This is done by including the wording ‘these competencies meet [insert skill set title or identified industry area] need’ on the Statement of Attainment. This wording applies only to skill sets that are formally identified as such in the endorsed Training Package. See the 2011 edition of the AQF Implementation Handbook for advice on wording on Statements of Attainment. See:

http://www.aqf.edu.au/Portals/0/Documents/Handbook/AQF_Handbook_07.pdf

Identified Skill Sets

Note: Refresher Training Skill Sets

The following Skill Sets have been developed to meet the requirements for refresher training of skills essential for gaining and maintaining access to electricity supply industry networks. The Refresher Training units in these Skill Sets are not included in any qualifications or elective schedules and are only to be accessed via the identified Skill Sets included below.

1.2 Competency Standards

Volume 1 Part 2

1.2.00 Competency Standards

Competency Standards

2.0 Introduction

Information in this section outlines how the competency standards were developed in broad terms. The industry coverage they can apply to, as well as the format and construction of the individual Competency Standard Units provided. Matters related to language, literacy and numeracy, access and equity and the regulatory environment in which the units may apply is also covered, as is the interrelated Essential Knowledge and Associated Skills. Competency standard units in this Training Package are interrelated and linked with the Definitions/Glossary and Essential Knowledge and Associated Skills sections. Therefore, each Competency Standard Unit, found in Volume 2, must not be used in isolation or exported without these interrelated components.

There are over 200 Competency Standard Units included.

A definitions/glossary to complement the Competency Standard Units is included in Volume 2 Part 1. The glossary provides a description of those words that are used in the Competency Standard Units to define terms in more detail. It also forms an integral part of each unit. An Essential Knowledge and Associated Skills section follows the Competency Standard Units and also forms an integrated part of each unit.

Included in this section is the following:

- an index of the Competency Standard Units – Table 1 in part 1.2.09– Index of Units and Scopes/Descriptors. The units have been placed in groups that would typically relate to a particular or special area of industry need and for ease in recognition of related unit groupings. Included at the end of Table 1 part 1.2.09 are the imported units that are located within the core of the qualifications in this Training Package.
- pre-requisites of each Competency Standard Unit can be obtained from Table 1 in part 1.2.09. Reference is also given for the correlation of the units within a qualification(s).
- a list of imported Competency Standard Units — located in Table 1 in part 1.2.09.

1.2.01 Development of Competency Standards for the ESI - Transmission, Distribution and Rail Sector

2.1 Development of Competency Standards for the ESI – Transmission, Distribution and Rail Sector

Competency Standards were initially developed for the function of Linework and Cable-Jointing, and were endorsed in 1993, by the then National Training Board (NTB). The 1993 version Competency Standard Units were updated and incorporated into the new Training Package framework. They were endorsed in 1998 as the Training Package for the Electricity Supply Industry – Transmission and Distribution sector of the Utilities Industry (UTT98). Subsequent minor amendments were made to include an array of qualifications, variations to Competency Standard Units and the inclusion of Rail as a sector.

Consequently, these revised units make up the group of units within this Training Package. They cover a broad range of knowledge and skills applied in the Transmission, Distribution and Rail industry. The development project satisfied the following characteristics:

- National Utilities and Electrotechnology ITAB (now known as EE-OZ Training Standards) and its nationwide focus groups appropriately represented the industry throughout Australia
- Development, consultation and validation included appropriate processes with a wide range of industry employer/employee, practitioners, providers, stakeholders/community, and regulatory and government agency representatives
- The draft standards were distributed throughout the national, State and Territory ITAB network and to industry stakeholders and, feedback from other industries was actively encouraged
- The competency standards were subjected to ongoing scrutiny during the process of development.

1.2.02 Industry Coverage

2.2 Industry Coverage

The Australian Standard Classifications of Occupation (ASCO) defines a number of occupations served by this Training Package that describes vocational standards for the Industry.

The typical job functions for specific qualifications can be located in Volume 1 Part 1 of this Training Package and highlight the industry coverage

The formal industry coverage is under ANZSIC Code 3610 in which the sector is defined as consisting of units mainly engaged in the Generation, transmission or distribution of electricity. Most vocations in this group have an entry level of skill commensurate with an AQF Certificate III or higher qualification. In some instances relevant experience is required in addition to a formal qualification.

There have been a number of changes within the industry and the sector has characterised during the last few years by the privatisation of many enterprises and the out-sourcing of many functions and activities.

Notwithstanding these changes these Competency Standards will cover approximately one third of the Electricity Supply Industry's direct workforce of 47,000 employees. The Standards may also provide coverage for the increasing contractor workforce, which is required to support sector activities.

The ESI Transmission, Distribution and Rail sector of the Industry contributes greatly to the economic and future needs of Australia. In Volume 1 Part 1, the section 'The Electricity Supply Industry' describes the Industry in detail.

The intent of the national ESI — Transmission, Distribution and Rail Training Package is to describe the skills and knowledge, which pertain to vocations within the field of Transmission, Distribution and Rail, and to offer a choice and range of qualifications or Competency Standard Unit through appropriate training for organisations, and personnel seeking formal recognition of respective skills and knowledge. It is recognised that other training pathways may exist in the form of other Training Packages and arrangements.

The prime objective of the national ESI — Transmission, Distribution and Rail Training Package is to establish the standards of performance in terms of skills and knowledge required for safe, productive and satisfying work covering a range of work activities referred to above. Registered Training Organisations (RTOs) can subsequently develop appropriate industry approved training programs to meet these objectives or indeed to meet other Training Package objectives. The determining factor will be choice, choice of Training Package, and choice of provider – RTO. Where New Apprenticeships apply choice in relation to funding to RTOs will be facilitated by policy enunciated by State and Territory Training Authorities.

Other industry standards

It is recognised that the ESI - Transmission, Distribution and Rail Industry Standards do not cover all the competencies, which are likely to be required and applied within organisations and workplaces. Nationally endorsed competency standards from other industries can be used where appropriate, provided they are imported in accordance with the criteria outlined in this Training Package.

Language, literacy, numeracy and Employability Skills.

The competency standards have been written to reflect the technical and operational needs of industry and include appropriate language, literacy and numeracy requirements. In general employability skills are embedded within the technical aspects of the industry units and in some instances, the Competency Standard Units directly address the employability skills. The relationship of employability skills to industry competencies is shown in part 1.1.03.

Access and equity

The knowledge and skills required of employees in the ESI — Transmission, Distribution and Rail industry are comprehensive and therefore many and varied employment opportunities are available. The Competency Standards reflect the range of knowledge and skills required and are written in a non-exclusive manner so as to increase the participation rates of under-represented groups and to minimise unintentional bias.

Contextualisation

In the Competency Standard Units, "notes" have been placed against respective aspects that include scope, performance criteria, range statement and essential knowledge and associated skills and other related sections. The insertion of these "notes" is primarily to provide users and support material developers with examples of the form and type related to technical content principles, technology, equipment, or processes that may be used to cover the outcomes. The examples should be treated as information that adds clarity for the purposes of assisting in guidance of the depth and breadth that is to be covered.

As the type, form, process, or technique of technology and equipment may change it is therefore expected and encumbered on RTOs to continue to be current in the content of their delivery arrangements. It is therefore appropriate for RTOs to use the notes in relation to technology and equipment references as advisory information. In these instances RTOs should aim to accommodate the adoption of improved and new technologies in the scope/range and essential knowledge and associated skills of the Competency Standard Units by varying the context examples given in the referenced 'Notes:' to the Performance Criteria, Range Statement and Essential Knowledge and Associated Skills. However, the contextualisation must not be such that the outcome of the Competency Standard Units is altered in any way.

Where contextualisation of the notes varies the outcome of the Competency Standard Unit and its related content, RTOs should consult with EE-Oz Training Standards to explore options for incorporating and/or covering the new arrangements, so that currency of the Training package is maintained.

It should be noted that any need to alter a Competency Standard Units from its intended outcome requires a new or varied Competency Standard Unit. Such changes are to be undertaken through the continuous improvement processes required of Training Packages, which in relation to this Training Package is managed by EE-Oz Training Standards. Also refer to the Qualifications Framework section of this ESI - Transmission, Distribution and Rail Training Package.

1.2.03 Unit Construction

2.3 Unit Construction

Competency Standard Units that have been successfully completed by learners are to be acknowledged. Some Competency Standard Units have been constructed in a manner that will allow reporting without further explanation. However, there are units from related Utilities Industry Training Packages that have been constructed in a manner that requires further reporting of relevant transferable information, i.e. a reporting statement of information that is meaningful for maximum recognition and skills transfer. Generally this would be any endorsement or subset of the unit, as well as detailed formal advice about essential knowledge and skills.

If, in future developments of this Training Package, endorsements are included, further information will be provided. Information can be found in the Electrotechnology Training Package.

Prerequisites

It is important to note that in relation to training delivery of prerequisites Competency Standard Units, training and formative staged assessments may be delivered for all, or part of the sequence of Competency Standard Units concurrently and at a different stage to the final assessment of each unit. However, the final assessment event and judgement for attributing competence for each unit is to follow the prerequisite sequence.

Exporting ESI CSUs from this Training Package

No Standard Competency Unit from this Training Package is to be used in isolation or exported without including all relevant interrelated components such as definitions, glossary, essential knowledge and skills, matters related to language, literacy and numeracy, access, equity, cultural diversity or any regulatory arrangements that apply.

1.2.04 Assessment Guidelines

2.4 Assessment Guidelines

The National Transmission, Distribution and Rail Industry have developed guidelines for the assessment of these standards. The guidelines are included at Volume 1 Part 3 of this Training Package.

1.2.05 National Qualifications

2.5 National Qualifications

The National Transmission, Distribution and Rail Industry has identified qualifications, which are linked to and use these competency standards. These are included in part 1.1.05 – Qualifications Framework of this Training Package.

A list of the qualification titles contained in this Training Package is provided in Part 1.1.05. Included in this section are details of the content and composition of the qualifications, the Industry Qualifications Framework, completion requirements and the rules for structuring and flexibility arrangements and the qualifications structure for each qualification. Further, there is a full description provided for each qualification, which explains its application and gives added meaning to the group of units making up the respective qualification.

1.2.06 Regulatory Arrangements - ESI - Transmission, Distribution and Rail Sector

2.6 Regulatory Arrangements — ESI - Transmission, Distribution and Rail Sector

The Transmission, Distribution and Rail Industry is subject to a high level of regulation and codes of practice related to the assembly, installation and maintenance of parts, components and the control and operation of equipment, apparatus and the like. The regulations and codes of practice are based on principles of the operation of overhead and underground wiring systems and associated circuits involving equipment, apparatus and systems, public safety, safety and health of individuals who work on systems and apparatus/equipment and other codes and practices related to the environment in which they are installed and maintained. Competency Standard Units in this Training Package have been developed in consultation with the relevant industry technical and business Regulators so that, where appropriate, these align to the requirements of legislation, regulations and mandated codes of practice.

Licensing and regulatory authorities will recognise a range of Competency Standard Units contained within this Training Package for respective licensing, registration or accreditation purposes. In constructing these Competency Standard Units, EE-Oz Training Standards and respective Regulators have given consideration to the link between the delivery and assessment of Competency Standard Units and the respective regulatory requirements. It is expected that the assessment and preferred training regime which meets a Competency Standard Unit's delivery and assessment requirements will therefore meet the relevant regulatory requirements.

In recognising this interrelationship, every effort has been made to ensure currency in regulatory requirements, thus RTOs must ensure they are observed. This includes utilising any recommended industry training program designed to meet Competency Standard Units which are related to licensing/registration applications.

As RTO's registered under the Australian Quality Training Framework (AQTF) requirements are given full responsibility for deeming a learner/apprentice competent for the respective Competency Standard Units within this Training Package. The RTO shall also provide all the necessary documentation (including results preferably percentile based) as required by the regulatory authority to support an application of eligibility for a relevant license, registration or accreditation.

It should be noted that regulatory authorities have advised that the quality of Registered Training Organisations awarding Competency Standard Units for regulatory purposes will be monitored. Where deficiencies are identified, regulators may deem it necessary to introduce appropriate actions, including an additional 'external' assessment following the issuing of the qualification to satisfy eligibility requirements for issuing the licence.

Statutes, regulations and codes of practice

Federal, State and Territory Electricity, Telecommunications, Occupational Health and Safety and Work Cover Acts and Regulations typically cover the Transmission, Distribution and Rail Industry. Further, there are other statutes, regulations, industrial instruments, codes of practice, guidelines and advisory standards, Australian/New Zealand and International Standards that apply to the Transmission, Distribution and Rail Industry.

State and Territory Regulators

Jurisdiction	Organisation	Website	Telephone Number
Australian Capital Territory	ACT Planning and Land Authority	www.actpla.act.gov.au	02 6207 1923
New South Wales	Office of Fair Trading	www.fairtrading.nsw.gov.au	133 220
Northern Territory	NT WorkSafe	www.worksafe.nt.gov.au	1800 019 115
Queensland	Department of Mines and	http://www.dme.qld.gov.au/Energy/gas.cfm	07 3237

	Energy		1626
South Australia	Office of the Technical Regulator	http://www.sa.gov.au/government/entity/959	08 8226 5500
South Australia	Office of Consumer and Business Affairs	www.ocba.sa.gov.au	08 8204 9696
Tasmania	WorkCover Tasmania	www.workcover.tas.gov.au	1300 776 572
Tasmania	Workplace Standards Tasmania	http://www.wst.tas.gov.au/industries/gas	1300 135 513
Victoria	Energy Safe Victoria	www.esv.vic.gov.au	03 9203 9700
Western Australia	Department of Consumer and Employment Protection - Energy Safety	www.energysafety.wa.gov.au	08 9422 5282
Western Australia	Office of Energy	http://www.energy.wa.gov.au/2/3176/64/gas .pm	08 9420 5600

Other Bodies

Organisation	Website
Standards Australia	www.standards.org.au
Department of Education, Employment and workplace Relations	http://www.deewr.gov.au/
SafeWork Australia	http://safeworkaustralia.gov.au/
Training.gov.au	http://training.gov.au/

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1.2.07 Maintenance of Competency Standards

2.7 Maintenance of Competency Standards

The Transmission, Distribution and Rail Industry Competency Standards were developed by, and are therefore owned by, the industry. However, it is acknowledged that copyright ownership with respect to this material rests with the Commonwealth.

The Competency Standards must be maintained so that they reflect the ongoing needs of the ESI — Transmission, Distribution and Rail Training Package sector and respond in a timely manner to changed technologies and circumstances.

The parties (as detailed in the Introduction to this Training Package) who constitute the ESI — Transmission, Distribution and Rail Training Package sector of the ElectroComms and EnergyUtilities Industry Skills Council share responsibility for the maintenance of the Competency Standards:

- Competency Standards maintenance will be coordinated and managed by ElectroComms and EnergyUtilities Industry Skills Council Ltd trading as EE-Oz Training Standards or its successor.
- Suggestions and proposals for changes from all parties are welcomed. These should be documented and submitted to EE-Oz Training Standards in accordance with its policies and procedures.
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1.2.08 What is Competency?

2.8 What is Competency?

The broad concept of industry competency relates to demonstrated performance of specified tasks and duties, expected in the workplace to a given standard as expressed in industry standards. Competency requires the demonstrated application of specified skills and knowledge and the ability to transfer and apply the skills and knowledge to new situations and environments, relevant to effective participation in work for an industry, industry sector or enterprise.

Competency covers all aspects of workplace performance and involves performing individual tasks; managing a range of different tasks; responding to contingencies or breakdowns; and dealing with the responsibilities of the workplace including the work environment and working with others.

Work performance competency requires the demonstrated application of specified skills, knowledge and aptitudes consistently over time and to a quality standard in the workplace, and the ability to transfer it to new situations and environments. In line with this concept of competency, Training Packages contain the vocational standards for industry and focus on what is expected of a competent individual in the workplace as an outcome of learning, rather than focussing on the learning process itself. The measure is not what the individual/learner knows, but has the individual/learner demonstrated performance to a standard, with what they know in a range of situations and range of applications.

Competency standards are determined by industry to meet identified industry skill needs. Competency standards are made up of a number of competency standard units each of which describes a key function or role in a particular job function or occupation. Each competency standard unit is usually linked to one or more AQF qualifications.

Contextualisation of Competency Standard Units by RTOs

RTOs may contextualise Competency Standard Units to reflect local outcomes required, provided that no requirements and/or completion rules of the Training Package for industry are infringed. This also includes any prevailing regulatory requirements that may apply to the Competency Standard Units. Contextualisation could involve additions or amendments to suit particular delivery methods, learner profiles, specific enterprise equipment requirements, or to otherwise meet local needs. The integrity of the overall intended outcome of the Competency Standard Units must be maintained and, not reduced.

Any contextualisation of Competency Standard Units in this endorsed Training Package must be within the bounds of the following advice. In contextualising Competency Standard Units, RTOs:

- must not contravene, diminish or detract from any regulatory/licensing arrangement that may apply to the unit, or its related delivery arrangements, and
- must not remove or add to the number and content of Elements and Performance Criteria
- may add specific industry terminology to Performance Criteria where this does not distort or narrow the competency outcomes, and/or
- may make amendments and additions to the Range Statement as long as such changes do not diminish the breadth of application of the competency and reduce its portability, and/or
- may add detail to the evidence guide in areas such as the critical aspects of evidence or resources and infrastructure required where these expand the breadth of the competency but do not limit its use.

Components of Competency Standard Units

The components of units of competency are summarised below, in the order in which they appear in each unit of competency.

Unit Title

The unit title is a succinct statement of the outcome of the unit of competency. Each unit of competency title is unique, both within and across Training Packages.

Unit Descriptor

The unit descriptor broadly communicates the content of the unit of competency and the skill area it addresses. Where units of competency have been contextualised from units of competency from other endorsed Training Packages, summary information is provided. There may also be a brief second paragraph that describes its relationship with other units of competency, and any licensing requirements.

Employability Skills

This sub-section contains a statement that the unit contains Employability skills.

Pre-requisite Units (optional)

If there are any units of competency that must be completed before the unit, these will be listed.

Application of the Unit

This sub-section fleshes out the unit of competency's scope, purpose and operation in different contexts, for example, by showing how it applies in the workplace.

Competency Field (Optional)

The competency field either reflects the way the units of competency are categorised in the Training Package or denotes the industry sector, specialisation or function. It is an optional component of the unit of competency.

Sector (optional)

The industry sector is a further categorisation of the competency field and identifies the next classification, for example an elective or supervision field.

Elements of Competency

The elements of competency are the basic building blocks of the unit of competency. They describe in terms of outcomes the significant functions and tasks that make up the competency.

Performance Criteria

The performance criteria specify the required performance in relevant tasks, roles, skills and in the applied knowledge that enables competent performance. They are usually written in passive voice. Critical terms or phrases may be written in bold italics and then defined in range statement, in the order of their appearance in the performance criteria.

Required Skills and Knowledge

The essential skills and knowledge are either identified separately or combined. Knowledge identifies what a person needs to know to perform the work in an informed and effective manner. Skills describe the application of knowledge to situations where understanding is converted into a workplace outcome.

Range Statement

The range statement provides a context for the unit of competency, describing essential operating conditions that may be present with training and assessment, depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts. As applicable, the meanings of key terms used in the performance criteria will also be explained in the range statement.

Evidence Guide

The evidence guide is critical in assessment as it provides information to the Registered Training Organisation (RTO) and assessor about how the described competency may be demonstrated. The evidence guide does this by providing a range of evidence for the assessor to make determinations, and by providing the assessment context. The evidence guide describes:

- conditions under which competency must be assessed including variables such as the assessment environment or necessary equipment;

- relationships with the assessment of any other units of competency;
- suitable methodologies for conducting assessment including the potential for workplace simulation;
- resource implications, for example access to particular equipment, infrastructure or situations;
- how consistency in performance can be assessed over time, various contexts and with a range of evidence; and
- the required underpinning knowledge and skills

Employability Skills in Units of Competency

The detail and application of Employability Skills facets will vary according to the job-role requirements of each industry. In developing Training Packages, industry stakeholders are consulted to identify appropriate facets of Employability Skills which are incorporated into the relevant units of competency and qualifications.

Employability Skills are not a discrete requirement contained in units of competency (as was the case with Key Competencies). Employability Skills are specifically expressed in the context of the work outcomes described in units of competency and will appear in elements, performance criteria, range statements and evidence guides. As a result, users of Training Packages are required to review the entire unit of competency in order to accurately determine Employability Skills requirements.

How Employability Skills relate to the Key Competencies

The eight nationally agreed Employability Skills now replace the seven Key Competencies in Training Packages. Trainers and assessors who have used Training Packages prior to the introduction of Employability Skills may find the following comparison useful.

Employability Skills	Mayer Key Competencies
Communication	Communicating ideas and information
Teamwork	Working with others and in teams
Problem solving	Solving problems Using mathematical ideas and techniques
Initiative and enterprise	
Planning and organising	Collecting, analysing and organising information Planning and organising activities
Self-management	
Learning	

Technology	Using technology
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When analysing the above table it is important to consider the relationship and natural overlap of Employability Skills. For example, using technology may involve communication skills and combine the understanding of mathematical concepts.

Explicitly embedding Employability Skills in units of competency

This Training Package seeks to ensure that industry-endorsed Employability Skills are explicitly embedded in units of competency. The application of each skill and the level of detail included in each part of the unit will vary according to industry requirements and the nature of the unit of competency.

Employability Skills must be both explicit and embedded within units of competency. This means that Employability Skills will be:

- embedded in units of competency as part of the other performance requirements that make up the competency as a whole
- explicitly described within units of competency to enable Training Packages users to identify accurately the performance requirements of each unit with regards to Employability Skills.

This Training Package also seeks to ensure that Employability Skills are well-defined and written into units of competency so that they are apparent, clear and can be delivered and assessed as an essential component of unit work outcomes.

Sample unit of competency components showing Employability Skills

The following table shows the sequence of a unit of competency, and each cell contains text taken from a range of units. It provides examples of where and how various Employability Skills could be embedded in each component.

Please note that in the example, the bracketed Employability Skills are provided for clarification only and would not be present in units of competency within this Training Package.

Unit Title	Give formal presentations and take part in meetings (Communication)
Unit Descriptor	This unit covers the skills and knowledge required to promote the use and implementation of innovative work practices to effect change. (Initiative and enterprise)
Element	Proactively resolve issues. (problem solving)
Performance Criteria	Information is organised in a format suitable for analysis and dissemination in accordance with organisational requirements. (Planning and organising)
Range Statement	Software applications may include email, internet, word processing, spreadsheet, database or accounting packages. (technology)

Required Skills and Knowledge	<p>Modify activities depending on differing workplace contexts, risk situations and environments. (Learning)</p> <p>Work collaboratively with others during a fire emergency. (teamwork)</p> <p>Instructions, procedures and other information relevant the maintenance of vessel and port security. (Communication)</p>
Evidence Guide	<p>Evidence of having worked constructively with a wide range of community groups and stakeholders to solve problems and adapt or design new solutions to meet identified needs in crime prevention. In particular, evidence must be obtained on the ability to:</p> <p>assess response options to identified crime-prevention needs and determine the optimal action to be implemented</p> <p>in consultation with relevant others, design an initiative to address identified issues. (Initiative and enterprise).</p>

Employability Skills Summaries and units of competency

An Employability Skills Summary exists for each qualification. Summaries include broad advice on industry expectations with regard to Employability Skills at the qualification level. Summaries should be used by trainers and assessors to assist in identifying the Employability Skills requirements contained within units of competency.

1.2.09 Index of Competency Standard Units

2.9 Index of Competency Standard Units

2.1.1 Cable Jointing Competency Standard Units

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
UETTDRCJ21A	Lay ESI electrical cables	20	3	UEENEEE101A UEENEEE107A UETTDREL11A UETTDREL16A	UET30812	UET30912 UET40412
UETTDRCJ22A	Install and maintain de-energised low voltage underground paper insulated cables.	40	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A		UET30812 UET40412

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEG102A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRLS41A UETTDRLS42A UETTDRLS55A		
UETTDRCJ23A	Install and maintain de-energised high voltage underground paper insulated cables.	60	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRLS41A UETTDRLS42A UETTDRLS55A		UET30812 UET40412
UETTDRCJ24A	Joint and maintain energised low voltage underground paper insulated cables	60	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A		UET30812 UET40412

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UETTDREL12A UETTDREL16A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A		
UETTDRCJ25A	Perform straight through high voltage paper insulated to polymeric transition joint	50	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A		UET30812 UET40412
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.	50	3	UEENEEE101A UEENEEE102A UEENEEE105A UEENEEE107A UETTDRCJ21A UETTDREL11A UETTDREL16A	UET30812	UET30912 UET40412
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.	50	3	UEENEEE101A UEENEEE102A UEENEEE105A UEENEEE107A UETTDRCJ21A UETTDREL11A UETTDREL16A	UET30812	UET30912 UET40412
UETTDRCJ28A	Joint and maintain	50	3	UEENEEE101A		UET30812

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
	energised low voltage underground polymeric cables			UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRLS41A UETTDRLS42A UETTDRLS55A		UET40412
UETTDRCJ29A	Install gas and oil filled specialised underground cables	60	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDRCJ21A UETTDRCJ23A UETTDRCJ26A UETTDRCJ27A UETTDRCJ99A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRLS41A UETTDRLS42A UETTDRLS55A		UET40412
UETTDRCJ30A	Maintain gas and oil filled specialised underground	60	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A		UET40412

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
	cables			UEENEEE107A UEENEEG101A UEENEEG102A UETTDRCJ21A UETTDRCJ23A UETTDRCJ26A UETTDRCJ27A UETTDRCJ99A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRLS41A UETTDRLS42A UETTDRLS55A		
UETTDRCJ31A	Install and maintain polymeric specialised underground cables	65	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDRCJ21A UETTDRCJ23A UETTDRCJ26A UETTDRCJ27A UETTDRCJ99A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRLS41A UETTDRLS42A UETTDRLS55A		UET40412
UETTDRCJ32A	Install and maintain gas and oil pressure systems for specialised	65	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A		UET40412

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
	underground cables			UEENEEG101A UEENEEG102A UETTDRCJ21A UETTDRCJ23A UETTDRCJ26A UETTDRCJ27A UETTDRCJ99A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRI41A UETTDRI42A UETTDRI55A		
UETTDRCJ33A	Install and maintain network infrastructure LV underground cables	40	4	UETTDRI46A UETTDREL11A UETTDREL16A UETTDRI62A UETTDRI63A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A		UET40612
UETTDRCJ34A	Install and maintain network	50	4	UETTDRCJ33A UETTDRI46A UETTDREL11A		UET40612

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
	infrastructure HV underground cables			UETTDREL16A UETTDRLS62A UETTDRLS63A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A		
UETTDRCJ99A	Test and verify distribution cable jointing installations	40	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRLS41A UETTDRLS42A UETTDRLS55A	UET30812	UET40412

2.1.2 Distribution Competency Standard Units

UNIT CODE	UNIT TITLE	Wtg . Pts	AQ F	Prerequisites.	Qualifications Core	Qualifications Electives
UETTD RDP11 A	Inspect overhead poles/structures and electrical apparatus	50	3	UEENEEE101A UEENEEE107A UETTDREL11A UETTDREL16A	UET30612	UET30512 UET30712 UET30912 UET40412
UETTD RDP12 A	Maintain overhead energised low voltage conductors and cables	60	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTD R IS52A UETTD R IS54A	UET30612	UET30512 UET30712 UET40412
UETTD RDP13 A	Maintain energised HV distribution overhead electrical apparatus (stick)	70	4	Pathway 1 Qualified and authorised Distribution Lineworker Pathway 2 BSBWOR402A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTD R DP11		UET40412

UNIT CODE	UNIT TITLE	Wtg . Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				A UETTDNDP12 A UETTDREL11 A UETTDREL12 A UETTDREL16 A UETTDNIS42A UETTDNIS52A UETTDNIS54A UETTDNIS65A		
UETTDNDP14 A	Maintain energised HV distribution overhead electrical apparatus (glove)	70	4	Pathway 1 Qualified and authorised Distribution Lineworker Pathway 2 BSBWOR402A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDNDP11 A UETTDNDP12 A UETTDREL11 A UETTDREL12 A UETTDREL16 A UETTDNIS42A		UET40412

UNIT CODE	UNIT TITLE	Wtg . Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDRIS52A UETTDRIS54A UETTDRIS65A		
UETTDRDP15 A	Inspect, maintain and restore energised low voltage overhead distribution network infrastructure	50	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEK142A UETTDREL16 A UETTDRIS46A UETTDRIS62A UETTDRIS63A UETTDRIS67A		UET40612
UETTDRDP99 A	Test and verify distribution overhead installations	40	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDRDP11 A	UEE30611	UET40412

UNIT CODE	UNIT TITLE	Wtg . Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDROP12 A UETTDREL11 A UETTDREL12 A UETTDREL16 A UETTDRI41A UETTDRI42A UETTDRI52A UETTDRI54A UETTDRI56A		

2.1.3 Design Competency Standard Units

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
UETTDORS31 A	Draft and layout a power system overhead distribution extension	60	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDREL11 A UETTDREL16 A UETTDRI62A UETTDRI63A		UET40412 UET50212 UET50312 UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
UETTD RDS32 A	Draft and layout a power system underground distribution extension	60	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDREL11 A UETTDREL16 A UETTD RIS62A UETTD RIS63A		UET40412 UET50212 UET50312 UET60212 UET60312
UETTD RDS33 A	Draft and layout a power system street lighting system	60	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDREL11 A UETTDREL16 A UETTD RIS62A UETTD RIS63A		UET40412 UET50212 UET50312 UET60212 UET60312
UETTD RDS34 A	Draft and layout a power system distribution substation minor upgrade	60	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDREL11		UET40412 UET50212 UET50312 UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				A UETTDREL16 A UETTDNIS62A UETTDNIS63A		
UETTDNDS35 A	Design overhead distribution power systems	140	5	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE125A UEENEEE126A UEENEEG101 A UEENEEG102 A UEENEEG149 A UETTDREL11 A UETTDREL16 A UETTDNIS62A UETTDNIS63A Pathway 1 UETTDNDS39 A UETTDNDS45 A Pathway 2 UETTDNDS43 A		UET50212 UET50312 UET60212 UET60312
UETTDNDS36 A	Design underground distribution	140	5	Common Group		UET50212 UET50312 UET60212

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
	power systems			UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE125A UEENEEE126A UEENEEG101 A UEENEEG102 A UEENEEG149 A UETTDREL11 A UETTDREL16 A UETTDNIS62A UETTDNIS63A Pathway 1 <hr/> UETTDNDS39 A UETTDNDS45 A Pathway 2 <hr/> UETTDNDS43 A		UET60312
UETTDNDS37 A	Design power system distribution substations	140	5	Common Group <hr/> UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE125A UEENEEE126A UEENEEG101 A		UET50212 UET50312 UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UEENEEG102 A UEENEEG149 A UETTDREL11 A UETTDREL16 A UETTDNIS62A UETTDNIS63A Pathway 1 UETTDNDS39 A UETTDNDS45 A Pathway 2 UETTDNDS43 A		
UETTDNDS38 A	Design power system public lighting systems	140	5	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE125A UEENEEE126A UEENEEG101 A UEENEEG102 A UEENEEG149 A UETTDREL11 A UETTDREL16 A		UET50212 UET50312 UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDRIS62A UETTDRIS63A Pathway1 UETTDRDS39 A UETTDRDS45 A Pathway 2 UETTDRDS43 A		
UETTDRDS39 A	Prepare and manage detailed construction plans for electrical power system infrastructure	140	5	UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDRIS62A UETTDRIS63A		UET50212 UET50312 UET60212 UET60312
UETTDRDS40 A	Prepare and appraise power systems financial impact statements	160	6	Common Group UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDRIS62A UETTDRIS63A		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDNIS62A UETTDNIS63A Testing Pathway <hr/> UEENEED104 A UEENEEE102A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG149 A UETTDRTS21 A UETTDRTS22 A UETTDRTS29 A UETTDRTS35 A Design Pathway <hr/> UETTDRDS39 A		
UETTDRDS41 A	Manage electrical power systems infrastructure projects	160	6	Common Group <hr/> UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDREL11 A UETTDREL16 A		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDNIS62A UETTDNIS63A Testing Pathway UEENEED104 A UEENEEE102A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG149 A UETTDRTS21 A UETTDRTS22 A UETTDRTS29 A UETTDRTS35 A Design Pathway UETTDRDS39 A		
UETTDRDS42 A	Investigate quality of power systems supply issues	140	5	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE125A UEENEEE126A UEENEEG101 A UEENEEG102 A		UET50212 UET60212

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UEENEEG149 A UETTDREL11 A UETTDREL16 A UETTDRLS62A UETTDRLS63A UETTDRLS35 A UETTDRLS36 A Pathway 1 UETTDRLS39 A UETTDRLS45 A Pathway 2 UETTDRLS43 A		
UETTDRLS43 A	Develop high voltage and low voltage distribution protection systems	150	5	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE125A UEENEEE126A UEENEEG101 A UEENEEG102 A UEENEEG149 A UETTDREL11 A UETTDREL16 A UETTDRLS62A		UET50212 UET50312 UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDNIS63A		
UETTDNRDS44 A	Design power system zone substations modifications	150	5	UEENEEE101A UEENEEE102A UEENEEE107A UETTDREL11 A UETTDREL16 A UETTDNIS62A UETTDNIS63A		UET50212 UET50312 UET60212 UET60312
UETTDNRDS45 A	Organise and implement ESI line and easement surveys	140	5	UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDNRDS39 A UETTDREL11 A UETTDREL16 A UETTDNIS62A UETTDNIS63A		UET50212 UET50312 UET60212 UET60312
UETTDNRDS46 A	Develop planned power systems outage strategies	140	5	UEENEEE101A UEENEEED104 A UETTDREL16 A UETTDNIS62A		UET50212 UET50312 UET60212 UET60312
UETTDNRDS47 A	Review power system asset management strategies	150	6	Common Group UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				A UEENEEG102 A UETTDREL11 A UETTDREL16 A UETTDNIS62A UETTDNIS63A Testing Pathway UEENEE104 A UEENEEE102A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG149 A UETTDRTS21 A UETTDRTS22 A UETTDRTS29 A UETTDRTS35 A Design Pathway UETTDNDS39 A		
UETTDNDS48 A	Analyse and appraise power system fault and outage data	150	6	UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				A UETTDARDS39 A UETTDREL11 A UETTDREL16 A UETTDARIS62A UETTDARIS63A		
UETTDARDS49 A	Establish and manage power system geographical information systems data	140	5	UEENEEE101A UEENEEED104 A UEENEEE107A UETTDREL16 A UETTDARIS62A		UET50212 UET50312 UET60212 UET60312
UETTDARDS50 A	Design customer power system substations	140	6	Common Group UEENEEE101A UEENEEE102A UEENEEE107A UETTDREL11 A UETTDREL16 A UETTDARIS62A UETTDARIS63A Pathway 1 UEENEEE104A UEENEEG101 A UEENEEG102 A UETTDARDS39 A UETTDARDS45 A		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				Pathway 2 UEENEEE104A UEENEEE125A UEENEEE126A UEENEEG101 A UEENEEG102 A UEENEEG149 A UETTD RDS43 A Pathway 3 UETTD RDS44 A		
UETTD RDS51 A	Manage power system transmission and sub-transmission design process	150	6	UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTD RDS39 A UETTD REL11 A UETTD REL16 A UETTD RIS62A UETTD RIS63A		UET60212 UET60312
UETTD RDS52 A	Design power system transmission, sub-transmission and zone substation buildings	160	6	UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDARDS39 A UETTDARDS44 A UETTDREL11 A UETTDREL16 A UETTDARIS62A UETTDARIS63A		
UETTDARDS53 A	Design power system transmission and sub-transmission substation primary plant	180	6	UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDARDS39 A UETTDARDS44 A UETTDREL11 A UETTDREL16 A UETTDARIS62A UETTDARIS63A		UET60212 UET60312
UETTDARDS54 A	Design power system transmission and sub-transmission protection and control	180	6	UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDARDS39 A UETTDARDS44 A UETTDREL11		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				A UETTDREL16 A UETTDNIS62A UETTDNIS63A		
UETTDNDS55 A	Design power system transmission and sub-transmission substation earthing	180	6	UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDNDS39 A UETTDNDS44 A UETTDREL11 A UETTDREL16 A UETTDNIS62A UETTDNIS63A		UET60212 UET60312
UETTDNDS56 A	Design power system transmission, sub-transmission and zone substation – civil and structural components	180	6	UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDNDS39 A UETTDNDS44 A UETTDREL11 A UETTDREL16 A UETTDNIS62A		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDNIS63A		
UETTDNRDS57 A	Design power system overhead transmission systems	180	6	UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDNRDS39 A UETTDNRDS45 A UETTDREL11 A UETTDREL16 A UETTDNIS62A UETTDNIS63A		UET60212 UET60312
UETTDNRDS58 A	Design underground transmission systems	180	6	UEENEEE101A UEENEEE104A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDNRDS39 A UETTDNRDS45 A UETTDREL11 A UETTDREL16 A UETTDNIS62A UETTDNIS63A		UET60212 UET60312

2.1.4 Entry Level Cross Discipline Competency Standard Units

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
UETTDREL11A	Apply sustainable energy and environmental procedures	20	3	Nil	UET30512 UET30612 UET30712 UET30812 UET30912 UET40412 UET50212 UET50312 UET60212 UET60312	
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus	40	3	UEENEEE101A UEENEEE107A UETTDREL16A	UET30512 UET30612 UET30712 UET30812 UET30912 UET40412	
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures	40	2	Nil	UET20312 UET20412 UET20612	
UETTDREL14A	Working safely near live electrical apparatus as a non-electrical worker	40	2	Nil	UET20312 UET20511 UET20612	
UETTDREL15A	Respond to power systems technical enquiries and requests	40	3	Nil	UET50312 UET60312	UET50212 UET60212
UETTDREL16A	Working safely near live electrical apparatus	20	3	Nil	UET30512 UET30612 UET30712 UET30812 UET30912 UET40412 UET40512	

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
					UET40612 UET50212 UET50312 UET60212 UET60312	
UETTDREL17A	Operate asset inspection machinery and equipment near live electrical apparatus	40	2	UEENEEE101A; UETTDREL13A; UETTDREL14A	UET20612	
UETTDREL18A	Inspect and treat poles and inspect electrical apparatus	40	2	UEENEEE101A; UETTDREL13A; UETTDREL14A	UET20612	
UETTDREL19A	Identify and interpret characteristics of electrical apparatus associated with power industry assets	40	2	UEENEEE101A; UETTDREL13A; UETTDREL14A	UET20612	
UETTDREL20A	Undertake minor vegetation control and routine minor maintenance of poles and electrical apparatus	40	2	UEENEEE101A; UETTDREL13A; UETTDREL14A; UETTDREL17A		UET20612
UETTDREL21A	Operate specialised data information equipment near live electrical	40	2	UEENEEE101A UETTDREL13A UETTDREL14A		UET20612

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
	apparatus					

2.1.5 Industry Specific Cross Discipline Competency Standard Units

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
UETTDRIS32 A	Solve electrical problems in remote community network apparatus	80	3	UEENEEE103A	UET30912	
UETTDRIS33 A	Solve electrical problems in remote community network systems	80	3	UEENEEE103A UETTDRIS32A	UET30912	
UETTDRIS34 A	Install and replace energy meters and associated equipment in remote communities	50	3	UEENEEE101A UEENEEE102A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEK101A UEENEEK102A UETTDREL12A		UET30912
UETTDRIS35 A	Perform remote community network field switching to a given schedule	40	3	UEENEEE101A UEENEEE102A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEK101A UEENEEK102A UETTDREL12A		UET30912
UETTDRIS36 A	Install and maintain low voltage services in remote communities	40	3	UEENEEE101A UEENEEE102A UEENEEE103A UEENEEE105A		UET30912

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
	(overhead)			UEENEEE107A UEENEEE137A UEENEEK101A UEENEEK102A UEENEEK116A UEENEEK120A UETTDREL11A UETTDREL16A UETTDNIS32A UETTDNIS33A UETTDNIS99A		
UETTDNIS37 A	Install and maintain low voltage services in remote communities (underground)	40	3	UEENEEE101A UEENEEE102A UEENEEE103A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEK101A UEENEEK102A UEENEEK116A UEENEEK120A UETTDREL11A UETTDREL16A UETTDNIS32A UETTDNIS33A UETTDNIS99A		UET30912
UETTDNIS38 A	Install and maintain public lighting systems in remote communities	40	3	UEENEEE101A UEENEEE102A UEENEEE103A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEK101A UEENEEK102A UEENEEK116A UEENEEK120A		UET30912

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDREL11A UETTDREL16A UETTDRLS32A UETTDRLS33A UETTDRLS99A		
UETTDRLS39A	Reserved					
UETTDRLS40A	Reserved					
UETTDRLS41A	Install network infrastructure electrical equipment	60	3	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A Transmission Overhead Pathway UETTDRLS54A UETTDRLTP26A UETTDRLTP27A UETTDRLTP29A Distribution Overhead Pathway UETTDRLDP12A UETTDRLS52A UETTDRLS54A UETTDRLS56A	UET30612 UET30812	UET30512 UET30712 UET40412

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				Rail Traction Pathway UETTDRIS52A UETTDRIS54A UETTDRRT21A UETTDRRT22A UETTDRRT23A UETTDRRT27A UETTDRRT28A Distribution Cable Jointing Pathway UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDRIS55A		
UETTDRIS42 A	Maintain network infrastructure electrical equipment	60	3	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A Transmission Overhead Pathway UETTDRIS41A UETTDRIS54A UETTD RTP26A UETTD RTP27A	UET30612 UET30812	UET30512 UET30712 UET40412

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTD RTP29A Distribution Overhead Pathway <hr/> UETTD RDP12A UETTD RIS41A UETTD RIS52A UETTD RIS54A UETTD RIS56A Rail Traction Pathway <hr/> UETTD RIS41A UETTD RIS52A UETTD RIS54A UETTD RRT21A UETTD RRT22A UETTD RRT23A UETTD RRT27A UETTD RRT28A Distribution Cable Jointing Pathway <hr/> UETTD RCJ21A UETTD RCJ26A UETTD RCJ27A UETTD RIS41A UETTD RIS55A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
UETTDNIS43 A	Perform low voltage field switching operation to a given schedule.	50	3	<p>Common Group</p> <p>UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL16A</p> <p>Transmission Overhead Pathway</p> <p>UETTDREL11A UETTDREL12A UETTDNIS43A UETTDNIS44A UETTDNIS45A UETTDNIS46A UETTDNIS47A UETTDNIS48A UETTDNIS49A</p> <p>Distribution Overhead Pathway</p> <p>UETTDREL11A UETTDNIS41A UETTDNIS42A UETTDNIS43A UETTDNIS44A UETTDNIS45A UETTDNIS46A UETTDNIS47A UETTDNIS48A UETTDNIS49A</p> <p>Rail Traction Pathway</p> <p>UETTDREL11A UETTDREL12A UETTDNIS41A</p>		<p>UET30512 UET30612 UET30712 UET30812 UET40412 UET40612</p>

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDNIS54A UETTDNRRT21A UETTDNRRT22A UETTDNRRT23A UETTDNRRT27A UETTDNRRT28A Distribution Cable Jointing Pathway UETTDREL11A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL12A UETTDNIS41A UETTDNIS42A UETTDNIS55A Electrical Pathway UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDNIS67A		
UETTDNIS44 A	Perform HV field switching operation to a given schedule	50	3	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A		UET30512 UET30612 UET30712 UET30812 UET40412 UET40612

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UEENEEG102A UETTDREL16A Transmission Overhead Pathway <hr/> UETTDREL11A UETTDREL12A UETTDRLS54A UETTDRTTP26A UETTDRTTP27A UETTDRTTP29A Distribution Overhead Pathway <hr/> UETTDREL11A UETTDRLDP12A UETTDREL12A UETTDRLS41A UETTDRLS42A UETTDRLS52A UETTDRLS54A UETTDRLS56A Rail Traction Pathway <hr/> UETTDREL11A UETTDREL12A UETTDRLS52A UETTDRLS54A UETTDRLRT21A UETTDRLRT22A UETTDRLRT23A UETTDRLRT27A UETTDRLRT28A Distribution Cable Jointing		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				Pathway UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDRI41A UETTDRI42A UETTDRI55A Electrical Pathway UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDRI67A		
UETTDRI45 A	Install and maintain ESI overhead distribution network infrastructure	40	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A		UET40612

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEG108A UEENEEG109A UEENEEK142A UETTDREL16A UETTDNIS62A UETTDNIS63A		
UETTDNIS46A	Install and maintain ESI network infrastructure electrical equipment	40	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEK142A UETTDREL16A UETTDNIS62A UETTDNIS63A		UET40612
UETTDNIS47A	Sample, test, filter and reinstate insulating oil	40	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG101A		UET40512 UET40612

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UEENEEG102A UEENEEG106A UEENEEK142A UETTDREL16A		
UETTDNIS48 A	Develop high voltage switching schedule	60	4	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL16A UETTDNIS44A Transmission Overhead Pathway UETTDREL11A UETTDREL12A UETTDNIS54A UETTDNIS26A UETTDNIS27A UETTDNIS29A Distribution Overhead Pathway UETTDREL11A UETTDNIS12A UETTDREL12A UETTDNIS41A UETTDNIS42A UETTDNIS52A UETTDNIS54A UETTDNIS56A Rail Traction		UET40412 UET40612

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				Pathway UETTDREL11A UETTDREL12A UETTDRLS52A UETTDRLS54A UETTDRLR21A UETTDRLR22A UETTDRLR23A UETTDRLR27A UETTDRLR28A Distribution Cable Jointing Pathway UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDRLS41A UETTDRLS42A UETTDRLS55A Electrical Pathway UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDRLS67A		
UETTDRLS49 A	Develop low voltage switching schedule	90	4	Common Group UEENEEE101A UEENEEE102A		UET40412 UET40612

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL16A UETTDREL43A Transmission Overhead Pathway UETTDREL11A UETTDREL12A UETTDREL54A UETTDREL26A UETTDREL27A UETTDREL29A Distribution Overhead Pathway UETTDREL11A UETTDREL12A UETTDREL12A UETTDREL41A UETTDREL42A UETTDREL52A UETTDREL54A UETTDREL56A Rail Traction Pathway UETTDREL11A UETTDREL12A UETTDREL52A UETTDREL54A UETTDREL21A UETTDREL22A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDRRRT23A UETTDRRRT27A UETTDRRRT28A Distribution Cable Jointing Pathway UETTDREL11A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL12A UETTDRLS41A UETTDRLS42A UETTDRLS55A Electrical Pathway UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDRLS67A		
UETTDRLS50A	Coordinate power system permit procedures	60	4	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL16A		UET40412 UET40612

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				Transmission Overhead Pathway UETTDREL11A UETTDREL12A UETTDNIS44A UETTDNIS54A UETTDNTP26A UETTDNTP27A UETTDNTP29A Distribution Overhead Pathway UETTDREL11A UETTDNDP12A UETTDREL12A UETTDNIS41A UETTDNIS42A UETTDNIS43A UETTDNIS52A UETTDNIS54A UETTDNIS56A Rail Traction Pathway UETTDREL11A UETTDREL12A UETTDNIS52A UETTDNIS54A UETTDNRT21A UETTDNRT22A UETTDNRT23A UETTDNRT27A UETTDNRT28A UETTDNRT30A Distribution		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				Cable Jointing Pathway UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDRLS41A UETTDRLS42A UETTDRLS43A UETTDRLS55A Electrical Pathway UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDRLS67A UETTDRLSB39A		
UETTDRLS51 A	Coordinate and direct power system switching schedules	60	4	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL16A Transmission Overhead Pathway		UET40412 UET40612

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDREL11A UETTDREL12A UETTDRLS44A UETTDRLS54A UETTDRT26A UETTDRT27A UETTDRT29A Distribution Overhead Pathway UETTDREL11A UETTDRLD12A UETTDREL12A UETTDRLS41A UETTDRLS42A UETTDRLS43A UETTDRLS52A UETTDRLS54A UETTDRLS56A Rail Traction Pathway UETTDREL11A UETTDREL12A UETTDRLS52A UETTDRLS54A UETTDRT21A UETTDRT22A UETTDRT23A UETTDRT27A UETTDRT28A UETTDRT30A Distribution Cable Jointing Pathway UETTDRCJ21A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDNIS41A UETTDNIS42A UETTDNIS43A UETTDNIS55A Electrical Pathway UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDNIS67A UETTDNISB39A		
UETTDNIS52 A	Install and maintain poles, structures and associated hardware	50	3	UEENEEE101A UEENEEE102A UEENEEE105A UEENEEE107A UETTDREL11A UETTDREL16A	UET30612 UET30712	UET30512 UET30912 UET40412
UETTDNIS53 A	Install and maintain power system public lighting	40	3	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A		UET30512 UET30612 UET30812 UET40412

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDREL12A UETTDREL16A Transmission Overhead Pathway <hr/> UETTDNIS54A UETTDNTP26A UETTDNTP27A UETTDNTP29A Distribution Overhead Pathway <hr/> UETTDNDP12A UETTDNIS41A UETTDNIS42A UETTDNIS52A UETTDNIS54A UETTDNIS56A Rail Traction Pathway <hr/> UETTDNIS52A UETTDNIS54A UETTDNRT21A UETTDNRT22A UETTDNRT23A UETTDNRT27A UETTDNRT28A Distribution Cable Jointing Pathway <hr/> UETTDNCJ21A UETTDNCJ26A UETTDNCJ27A UETTDNIS41A UETTDNIS42A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDNIS55A		
UETTDNIS54 A	Install and maintain poles, structures, overhead conductors and cables	60	3	UETTDNIS52A UETTDREL11A UETTDREL12A UETTDREL14A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A	UET30512 UET30612 UET30712	UET30912 UET40412
UETTDNIS55 A	Install and maintain low voltage underground services	40	3	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL16A Transmission Overhead Pathway UETTDREL11A UETTDREL12A UETTDNIS54A UETTDRTTP26A UETTDRTTP27A UETTDRTTP29A Distribution Overhead Pathway UETTDNDP12A UETTDREL11A UETTDREL12A	UET30812	UET40412

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDNIS41A UETTDNIS42A UETTDNIS52A UETTDNIS54A UETTDNIS56A Rail Traction Pathway UETTDREL11A UETTDREL12A UETTDNIS52A UETTDNIS54A UETTDNRRT21A UETTDNRRT22A UETTDNRRT23A UETTDNRRT27A UETTDNRRT28A Distribution Cable Jointing Pathway UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A Electrotechnology Electrician Pathway UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDNIS67A		
UETTDNIS56 A	Install and maintain low voltage overhead services	40	3	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL16A Transmission Overhead Pathway UETTDREL11A UETTDREL12A UETTDNIS54A UETTDRTTP26A UETTDRTTP27A UETTDRTTP29A Distribution Overhead Pathway UETTDNDP12A UETTDREL11A UETTDREL12A UETTDNIS52A UETTDNIS54A Rail Traction Pathway UETTDREL11A UETTDREL12A UETTDNIS52A UETTDNIS54A UETTDNDRT21A	UET30612	UET30512 UET40412

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDRRRT22A UETTDRRRT23A UETTDRRRT27A UETTDRRRT28A Distribution Cable Jointing Pathway UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDRLS41A UETTDRLS42A UETTDRLS55A Electrotechnolog y Electrician Pathway UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDRLS67A		
UETTDRLS57 A	Conduct visual checking and treatment of power system poles and structures	30	3	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A		UET30512 UET30612 UET30712 UET40412

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDREL11A UETTDREL12A UETTDREL16A Transmission Overhead Pathway <hr/> UETTDNIS54A UETTDNTP26A UETTDNTP27A UETTDNTP29A UETTDNTP30A Distribution Overhead Pathway <hr/> UETTDNDP11A UETTDNDP12A UETTDNIS41A UETTDNIS42A UETTDNIS52A UETTDNIS54A UETTDNIS56A Rail Traction Pathway <hr/> UETTDNIS52A UETTDNIS54A UETTDNRT21A UETTDNRT22A UETTDNRT23A UETTDNRT27A UETTDNRT28A Distribution Cable Jointing Pathway <hr/> UETTDNRCJ21A UETTDNRCJ26A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualifications Core	Qualifications Electives
				UETTDRCJ27A UETTDROP11A UETTDRI41A UETTDRI42A UETTDRI55A		
UETTDRI58A	Locate faults in power system underground power cables	60	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRI41A UETTDRI42A UETTDRI55A		UET30812 UET40412
UETTDRI59A	Conduct high potential testing of power system underground power cables	50	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRI41A UETTDRI42A		UET30812 UET40412

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDRIS55A		
UETTDRIS60 A	Install and replace power system energy meters and associated equipment	50	3	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL16A Distribution Overhead Pathway UETTDRDP12A UETTDREL11A UETTDREL12A UETTDRIS41A UETTDRIS42A UETTDRIS52A UETTDRIS54A UETTDRIS56A Distribution Cable Jointing Pathway UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDRIS41A UETTDRIS42A UETTDRIS55A Electrotechnology Electrician Pathway		UET30612 UET30812 UET40412

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG103A UEENEEG104A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEK142A		
UETTDRI61 A	Install mobile Generation set for synchronised LV Genset	50	3	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL16A Transmission Overhead Pathway UETTDREL11A UETTDREL12A UETTDRI54A UETTDRT26A UETTDRT27A UETTDRT29A Distribution Overhead Pathway UETTDROP12A UETTDREL11A UETTDREL12A		UET30512 UET30612 UET30712 UET30812 UET40412

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDNIS41A UETTDNIS42A UETTDNIS52A UETTDNIS54A UETTDNIS56A Rail Traction Pathway <hr/> UETTDREL11A UETTDREL12A UETTDNIS52A UETTDNIS54A UETTDNRRT21A UETTDNRRT22A UETTDNRRT23A UETTDNRRT27A UETTDNRRT28A Distribution Cable Jointing Pathway <hr/> UETTDRCJ21A UETTDRCJ26A UETTDRCJ27A UETTDREL11A UETTDREL12A UETTDNIS41A UETTDNIS42A UETTDNIS55A Electrotechnolog y Electrician Pathway <hr/> UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG103A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEG104A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEK142A		
UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs	30	4	UEENEEE101A UETTDREL16A	UET40412 UET40512 UET40612 UET50212 UET50312 UET60212 UET60312	
UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures	30	4	Electrotechnology Pathway UEENEEK142A ESI – TDR Pathway UETTDREL11A	UET40412 UET40512 UET40612 UET50212 UET50312 UET60212 UET60312	
UETTDRI64A	Install mobile Generation set for synchronised HV Genset	40	3	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL16A Transmission Overhead Pathway UETTDREL11A UETTDREL12A UETTDRI44A UETTDRI54A		UET40412

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTD RTP26A UETTD RTP27A UETTD RTP29A Distribution Overhead Pathway UETTD REL11A UETTD RDP12A UETTD REL12A UETTD RIS41A UETTD RIS42A UETTD RIS43A UETTD RIS52A UETTD RIS54A UETTD RIS56A Rail Traction Pathway UETTD REL11A UETTD REL12A UETTD RIS52A UETTD RIS54A UETTD RRT21A UETTD RRT22A UETTD RRT23A UETTD RRT27A UETTD RRT28A UETTD RRT30A Distribution Cable Jointing Pathway UETTD RCJ21A UETTD RCJ26A UETTD RCJ27A UETTD REL11A UETTD REL12A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDRIS41A UETTDRIS42A UETTDRIS43A UETTDRIS55A Electrical Pathway UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDRIS67A UETTDRSB39A		
UETTDRIS65A	Contribute to coordinated HV live working	50	3	Nil		UET40412
UETTDRIS66A	Manage an electricity power system OHS management system	140	5	Nil		UET50212 UET50312 UET60212 UET60312
UETTDRIS67A	Solve problems in energy supply network equipment	80	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UEENEEG006A UEENEEG106A		UET40512 UET40612 UET50212 UET50312 UET60212 UET60312
UETTDRIS68A	Solve problems in energy supply network protection	40	3	UEENEEE101A UEENEEE102A UEENEEE104A		UET40512 UET40612 UET50212 UET50312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
	equipment and systems			UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UEENEEG006A UEENEEG106A UETTDRIS67A		UET60212 UET60312
UETTDRIS69 A	Diagnose and rectify faults in energy supply apparatus	60	5	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UEENEEG006A UEENEEG106A UETTDRIS67A UETTDRIS68A		UET50212 UET50312 UET60212 UET60312
UETTDRIS70 A	Diagnose and rectify faults in electrical energy distribution systems	60	5	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UEENEEG006A UEENEEG106A UETTDRIS67A UETTDRIS68A UETTDRIS69A		UET50212 UET50312 UET60212 UET60312
UETTDRIS71 A	Diagnose and rectify faults in electrical energy supply transmission systems	60	5	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A		UET50212 UET50312 UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEG102A UEENEEG006A UEENEEG106A UETTDRIS67A UETTDRIS68A UETTDRIS69A		
UETTDRIS72A	Diagnose and rectify faults in distributed Generation systems	60	5	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UEENEEG006A UEENEEG106A UETTDRIS67A UETTDRIS68A UETTDRIS69A		UET50212 UET50312 UET60212 UET60312
UETTDRIS73A	Develop engineering solutions for energy supply power transformer problems	60	6	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG006A UEENEEG106A UEENEEG149A UETTDRIS67A UETTDRIS68A UETTDRIS69A Distribution		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				Pathway Unit UETTDNIS70A Transmission Pathway Unit UETTDNIS71A Distributed Generation Pathway UETTDNIS72A		
UETTDNIS74 A	Develop engineering solutions for energy supply system protection problems	60	6	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG006A UEENEEG106A UEENEEG149A UETTDNIS67A UETTDNIS68A UETTDNIS69A Distribution Pathway UETTDNIS70A Transmission Pathway UETTDNIS71A Distributed Generation Pathway		UET60212

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDNIS72A		
UETTDNIS81A	Install and maintain telecommunications infrastructure on electricity supply industry assets	80	2	UEENEEE101A UEENEEE102A UEENEEE105A UETTDREL14A	UET20511	
UETTDNIS99A	Test and verify distribution remote area installations	40	3	UEENEEE101A UEENEEE102A UEENEEE103A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEK101A UEENEEK102A UEENEEK116A UEENEEK120A UETTDREL11A UETTDREL16A UETTDNIS32A UETTDNIS33A	UET30912	

2.1.6 Refresher Training Competency Standard Units

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites .	Qualification s Core	Qualification s Electives
UETTDRRF01B	Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus	20	3	Nil	Skill Set Only	
UETTDRRF02B	Perform pole top rescue	20	3	HLTAID001	Skill Set Only	
UETTDRRF03	Perform EWP	20	3	HLTAID001	Skill Set	

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites .	Qualification s Core	Qualification s Electives
UETTDRRF01 B	Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus	20	3	Nil	Skill Set Only	
B	rescue				Only	
UETTDRRF04 B	Perform tower rescue	20	3	HLTAID001	Skill Set Only	
UETTDRRF05 B	Perform rescue from switchyard structures at heights	20	3	HLTAID001	Skill Set Only	
UETTDRRF06 B	Perform rescue from a live LV panel	20	3	HLTAID001	Skill Set Only	
UETTDRRF07 B	Perform cable pit/trench/excavation rescue	20	3	HLTAID001	Skill Set Only	
UETTDRRF08 B	Perform EWP controlled descent escape	20	3	Nil	Skill Set Only	
UETTDRRF09 B	Apply access procedures to work on or near electrical network infrastructure	20	3	Nil	Skill Set Only	
UETTDRRF10 B	Provide first aid in an ESI environment	20	3	HLTAID001	Skill Set Only	
UETTDRRF11 A	Testing of connections to low voltage electricity networks	20	3	Nil	Skill Set Only	

2.1.7 Rail Traction Competency Standard Units

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
UETTDRRRT21A	Install traction overhead	50	3	UEENEEEE101A UEENEEEE102A	UET30712	UET40412

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
	wiring systems			UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTDNIS52A UETTDNIS54A		
UETTDRT22A	Maintain traction overhead wiring systems	60	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTDNIS52A UETTDNIS54A UETTDRT21A	UET30712	UET40412
UETTDRT23A	Install rail traction bonds	40	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTDNIS52A UETTDNIS54A		UET30712 UET40412
UETTDRT24A	Maintain rail traction bonds	50	3	UEENEEE101A		UET30712 UET40412

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTDNIS52A UETTDNIS54A UETTDNRT21A UETTDNRT22A UETTDNRT23A UETTDNRT27A UETTDNRT28A		
UETTDNRT25A	Install overhead rail traction configurations	50	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTDNIS52A UETTDNIS54A UETTDNRT21A UETTDNRT22A UETTDNRT23A UETTDNRT27A UETTDNRT28A		UET30712 UET40412
UETTDNRT26A	Maintain overhead rail traction configurations	60	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A		UET30712 UET40412

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTDNIS52A UETTDNIS54A UETTDNRT21A UETTDNRT22A UETTDNRT23A UETTDNRT25A UETTDNRT27A UETTDNRT28A		
UETTDNRT27A	Install overhead traction components and equipment	50	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTDNIS52A UETTDNIS54A	UET30712	UET40412
UETTDNRT28A	Maintain overhead traction components and equipment	60	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A	UET30712	UET40412

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UETTDNIS52A UETTDNIS54A UETTDNRRT27A		
UETTDNRRT29A	Operate rail road traction height access equipment.	20	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTDNIS52A UETTDNIS54A UETTDNRRT21A UETTDNRRT22A UETTDNRRT27A UETTDNRRT28A		UET30712 UET40412
UETTDNRRT30A	Perform to a given schedule rail traction switching operations	50	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTDNIS52A UETTDNIS54A UETTDNRRT21A UETTDNRRT22A UETTDNRRT27A UETTDNRRT28A		UET30712 UET40412
UETTDNRRT31A	Maintain energised d.c.	60	4	Pathway 1		UET40412

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
	traction overhead wiring system			Qualified and authorised Rail Traction Lineworker Pathway 2 BSBWOR402A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRI52A UETTDRI54A UETTDRI65A UETTDRT21A UETTDRT22A UETTDRT23A UETTDRT25A UETTDRT26A UETTDRT27A UETTDRT28A UETTDRT29A UETTDRT99A		
UETTDRT32A	Maintain energised traction overhead electrical apparatus using stick techniques	70	4	Pathway 1 Qualified and authorised Rail Traction Lineworker Pathway 2 BSBWOR402A UEENEEE101A		UET40412

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRLS52A UETTDRLS54A UETTDRLS65A UETTDRT21A UETTDRT22A UETTDRT23A UETTDRT25A UETTDRT26A UETTDRT27A UETTDRT28A UETTDRT29A UETTDRT31A UETTDRT99A		
UETTDRT33A	Maintain energised traction overhead electrical apparatus using glove techniques	70	4	Pathway 1 Qualified and authorised Rail Traction Lineworker Pathway 2 BSBWOR402A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A		UET40412

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UETTDREL11A UETTDREL12A UETTDREL16A UETTDRLS52A UETTDRLS54A UETTDRLS65A UETTDRT21A UETTDRT22A UETTDRT23A UETTDRT25A UETTDRT26A UETTDRT27A UETTDRT28A UETTDRT29A UETTDRT31A UETTDRT99A		
UETTDRT34A	Install and maintain traction network wiring systems	40	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEK142A UETTDREL16A UETTDRLS62A		UET40612

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UETTD RIS63A UETTD RIS67A		
UETTD RRT35A	Install and maintain traction network equipment and components	40	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEK142A UETTDREL16A UETTD RIS62A UETTD RIS63A UETTD RIS67A UETTD RRT34A		UET40612
UETTD RRT36A	Maintain traction network wiring systems	40	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A		UET40612

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDREL16A UETTDRIS62A UETTDRIS63A UETTDRIS67A		
UETTDRT37A	Maintain traction network components and equipment	40	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDREL16A UETTDRIS62A UETTDRIS63A UETTDRIS67A UETTDRT36A		UET40612
UETTDRT99A	Test and verify rail traction installations	40	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A	UET30712	UET40412

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UETTDREL16A UETTDRLS52A UETTDRLS54A UETTDRT21A UETTDRT22A UETTDRT27A UETTDRT28A		

2.1.8 Substation Competency Standard Units

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
UETTDRSB21A	Diagnose and rectify faults in substation environment	40	4	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A Electrician Pathway UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG107A Electrical Fitter		UET40512

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				Pathway UEENEEG199A		
UETTDRSB22A	Carry out power systems substation inspection	60	4	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A Electrician Pathway UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG107A Electrical Fitter Pathway UEENEEG199A	UET40512	
UETTDRSB23A	Install and maintain substation direct current systems	30	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A	UET40512	

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEK142A		
UETTDRSB24A	Maintain high voltage power system circuit breakers	60	4	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A Electrician Pathway UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG107A Electrical Fitter Pathway UEENEEG199A		UET40512
UETTDRSB25A	Maintain high	80	4	Common Group		UET40512

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
	voltage power and instrument transformers			UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A Electrician Pathway UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG107A Electrical Fitter Pathway UEENEEG199A		
UETTDRSB26A	Install high current DC equipment and switchgear	40	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG103A		UET40512

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEK142A		
UETTDRSB27A	Maintain high current DC equipment and switchgear	40	4	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A Electrician Pathway UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG107A Electrical Fitter Pathway UEENEEG199A		UET40512
UETTDRSB29A	Maintain capacitor bank equipment for voltage regulation	40	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A		UET40512

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEE137A UEENEEG006A UEENEEG101A UEENEEG102A UEENEEG106A UEENEEK142A		
UETTDRSB30A	Maintain high voltage power system static VAR compensators (SVC)	30	4	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDRSB25A UETTDRSB29A Electrician Pathway UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG107A Electrical Fitter Pathway UEENEEG199A		UET40512
UETTDRSB31A	Maintain high voltage power system	50	4	Common Group		UET40512

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
	synchronous condensers			UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A Electrician Pathway UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG107A Electrical Fitter Pathway UEENEEG199A		
UETTDRSB32A	Maintain power transformer on load tap changers (OLTC)	80	4	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A		UET40512

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEG102A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDRSB25A Electrician Pathway UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG107A Electrical Fitter Pathway UEENEEG199A		
UETTDRSB33A	Install high voltage plant and equipment	50	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEK142A		UET40512
UETTDRSB34A	Carry out surveys using thermovision techniques	30	4	Common Group UEENEEE101A UEENEEE102A		UET40512

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A Electrician Pathway UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG107A Electrical Fitter Pathway UEENEEG199A		
UETTDRSB35A	Maintain discrete control and protection systems	80	4	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG106A		UET40512

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEG108A UEENEEG109A UEENEEK142A Electrician Pathway UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG107A Electrical Fitter Pathway UEENEEG199A		
UETTDRSB36A	Commission discrete control and protection systems	30	4	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDRSB25A UETTDRSB29A Electrician Pathway UEENEEG103A UEENEEG104A UEENEEG105A		UET40512

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEG107A Electrical Fitter Pathway UEENEEG199A		
UETTDRSB37A	Maintain power system distribution field devices	80	4	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A Electrician Pathway UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG107A Electrical Fitter Pathway UEENEEG199A		UET40512
UETTDRSB38A	Commission power system distribution field devices	30	4	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A		UET40512

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDRSB37 Electrician Pathway UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG107A Electrical Fitter Pathway UEENEEG199A		
UETTDRSB39A	Perform power system substation switching operation to a given schedule	50	3	Common Group UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDRS16A Transmission Overhead Pathway UETTDRS11A UETTDRS12A UETTDRS54A		UET30512 UET30612 UET30712 UET30812 UET40412 UET40512 UET40612

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UETTD RTP26A UETTD RTP27A UETTD RTP29A Distribution Overhead Pathway <hr/> UETTD RDP12A UETTD REL11A UETTD REL12A UETTD RIS41A UETTD RIS42A UETTD RIS52A UETTD RIS54A UETTD RIS56A Rail Traction Pathway <hr/> UETTD REL11A UETTD REL12A UETTD RIS52A UETTD RIS54A UETTD RRT21A UETTD RRT22A UETTD RRT23A UETTD RRT27A UETTD RRT28A Distribution Cable Jointing Pathway <hr/> UETTD RCJ21A UETTD RCJ26A UETTD RCJ27A UETTD REL11A UETTD REL12A UETTD RIS41A UETTD RIS42A UETTD RIS55A		

UNIT CODE	UNIT TITLE	Wtg Pts	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				Electrical Pathway UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG106A UEENEEG108A UEENEEG109A UEENEEK142A UETTDRIS67A		

2.1.9 System Operations Competency Standard Units

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
UETTDRSO3 2A	Manage power systems network faults	180	6	Common Group UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDRREL11A UETTDRREL16A UETTDRIS62A UETTDRIS63A UETTDRSO41A UETTDRSO48A UETTDRSO49A		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
				UETTDRSO50A Generation/Distributi on and Subtransmission Pathway		
				UETTDRSO34A UETTDRSO37A UETTDRSO40A Generation/Transmiss ion Pathway		
				UETTDRSO34A UETTDRSO38A UETTDRSO47A Distribution and Subtransmission Pathway		
				UETTDRSO35A UETTDRSO37A UETTDRSO40A Transmission Pathway		
				UETTDRSO38A UETTDRSO41A UETTDRSO42A UETTDRSO47A		
UETTDRSO3 3A	Manage power systems critical events	180	6	Common Group UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
				UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A UETTDRSO32A UETTDRSO41A UETTDRSO48A UETTDRSO49A UETTDRSO50A Generation/Distributi on and Subtransmission Pathway		
				UETTDRSO34A UETTDRSO37A UETTDRSO40A Generation/Transmiss ion Pathway		
				UETTDRSO34A UETTDRSO38A UETTDRSO47A Distribution and Subtransmission Pathway		
				UETTDRSO35A UETTDRSO37A UETTDRSO40A Transmission Pathway		
				UETTDRSO38A UETTDRSO41A UETTDRSO42A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
				UETTDRSO47A		
UETTDRSO3 4A	Control power systems generating plant	140	6	Common Group UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A UETTDRSO48A UETTDRSO49A Distribution and Subtransmission Pathway UETTDRSO37A UETTDRSO40A Transmission Pathway UETTDRSO38A UETTDRSO47A		UET60212 UET60312
UETTDRSO3 5A	Manage high voltage distribution and subtransmissi on network demand	180	6	Common Group UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
				UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A UETTDRSO48A UETTDRSO49A Distribution and Subtransmission Pathway UETTDRSO37A UETTDRSO40A Transmission Pathway UETTDRSO38A UETTDRSO47A		
UETTDRSO3 6A	Develop low voltage distribution switching programs	150	5	UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A		UET50212;

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
				UETTDRIS63A		
UETTDRSO3 7A	Develop high voltage distribution and subtransmissi on switching programs	150	5	UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A		UET50212; UET50312 UET60212 UET60312
UETTDRSO3 8A	Develop and evaluate power systems transmission switching programs	150	5	UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A		UET50212; UET50312 UET60212 UET60312
UETTDRSO3 9A	Coordinate low voltage distribution networks	150	5	UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A		UET50212; UET50312 UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
				UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A UETTDRSO36A		
UETTDRSO4 0A	Coordinate high voltage distribution and subtransmissi on networks	150	5	UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A UETTDRSO37A		UET50212; UET50312 UET60212 UET60312
UETTDRSO4 1A	Manage power systems transmission networks	180	6	Common Group UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
				UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A UETTDRSO48A UETTDRSO49A Distribution and Subtransmission Pathway UETTDRSO37A UETTDRSO40A Transmission Pathway UETTDRSO38A UETTDRSO47A		
UETTDRSO4 2A	Manage power systems transmission network demand	180	6	Common Group UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
				UETTDRSO41A UETTDRSO48A UETTDRSO49A Distribution and Subtransmission Pathway UETTDRSO37A UETTDRSO40A Transmission Pathway UETTDRSO38A UETTDRSO47A		
UETTDRSO4 3A	Coordinate low voltage distribution network demand	150	5	UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A UETTDRSO36A UETTDRSO39A		UET50212; UET50312 UET60212 UET60312
UETTDRSO4 4A	Develop crisis power systems management plans	140	6	Common Group UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
				UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A UETTDRSO32A UETTDRSO33A UETTDRSO41A UETTDRSO48A UETTDRSO49A UETTDRSO50A Generation/Distributi on and Subtransmission Pathway		
				UETTDRSO34A UETTDRSO37A UETTDRSO40A Generation/Transmiss ion Pathway		
				UETTDRSO34A UETTDRSO38A UETTDRSO47A Distribution and Subtransmission Pathway		
				UETTDRSO35A UETTDRSO37A UETTDRSO40A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
				Transmission Pathway UETTDRSO38A UETTDRSO41A UETTDRSO42A UETTDRSO47A		
UETTDRSO4 5A	Operate and monitor system SCADA equipment	150	5	UETTDRREL15A	UET50312 UET60312	UET50212; UET60212
UETTDRSO4 6A	Monitor and control the field staff activities	150	5	Common Group UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDRREL11A UETTDRREL16A UETTDRIS62A UETTDRIS63A Distribution and Subtransmission Pathway Unit Group UETTDRSO37A UETTDRSO40A Transmission Pathway Unit Group UETTDRSO38A UETTDRSO47A		UET50212; UET50312 UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualifications Core	Qualifications Electives
UETTDRSO4 7A	Coordinate high voltage transmission network	150	5	UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A UETTDRSO38A		UET50212; UET50312 UET60212 UET60312
UETTDRSO4 8A	Respond to discrete and interdependent protection operations	150	5	Common Group UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A Distribution and Subtransmission Pathway		UET50212; UET50312 UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
				UETTDRSO37A UETTDRSO40A Transmission Pathway UETTDRSO38A UETTDRSO47A		
UETTDRSO4 9A	Coordinate power system operations in a regulated energy market	150	5	Common Group UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDRREL11A UETTDRREL16A UETTDRIS62A UETTDRIS63A Distribution and Subtransmission Pathway UETTDRSO37A UETTDRSO40A Transmission Pathway UETTDRSO38A UETTDRSO47A		UET50212; UET50312 UET60212 UET60312
UETTDRSO5 0A	Respond to complex power system protection	180	6	Common Group UEENEED104A		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
	operations			UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11A UETTDREL16A UETTDRIS62A UETTDRIS63A UETTDRSO41A UETTDRSO48A UETTDRSO49A Generation/Distribution and Subtransmission Pathway UETTDRSO34A UETTDRSO37A UETTDRSO40A Generation/Transmission Pathway UETTDRSO34A UETTDRSO38A UETTDRSO47A Distribution and Subtransmission Pathway UETTDRSO35A UETTDRSO37A UETTDRSO40A Transmission		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
				Pathway UETTDRSO38A UETTDRSO41A UETTDRSO42A UETTDRSO47A		
UETTDRSO5 1A	Manage network systems power flows	180	6	Common Group UEENEEED104A UEENEEED101A UEENEEED102A UEENEEED104A UEENEEED107A UEENEEED124A UEENEEED125A UEENEEED126A UEENEEEG101A UEENEEEG102A UEENEEEG149A UETTDRREL11A UETTDRREL16A UETTDRIS62A UETTDRIS63A UETTDRSO32A UETTDRSO41A UETTDRSO48A UETTDRSO49A UETTDRSO50A Generation/Distributi on and Subtransmission Pathway UETTDRSO34A UETTDRSO37A UETTDRSO40A Generation/Transmiss ion Pathway		UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualificatio ns Core	Qualificatio ns Electives
				UETTDRSO34A UETTDRSO38A UETTDRSO47A Distribution and Subtransmission Pathway		
				UETTDRSO35A UETTDRSO37A UETTDRSO40A Transmission Pathway		
				UETTDRSO38A UETTDRSO41A UETTDRSO42A UETTDRSO47A		

2.1.10 Transmission Competency Standard Units

UNIT CODE	UNIT TITLE	Wtg. Point s	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
UETTDRT22 A	Establish and reinstate a power systems transmission structure work site	80	2	UEENEEE101A UETTDREL13 A		UET20412
UETTDRT23 A	Erect power systems transmission structures	100	2	UEENEEE101A UETTDREL13 A	UET20412	
UETTDRT24 A	Erect power systems transmission structure hardware	60	2	UEENEEE101A UETTDREL13 A UETTDRT23 A		UET20412

UNIT CODE	UNIT TITLE	Wtg. Points	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
UETTD RTP25 A	Pre-tension stringing overhead transmission conductors and cables	80	2	UEENEEE101A UETTDREL13A UETTD RTP23A UETTD RTP24A		UET20412
UETTD RTP26 A	Install transmission structures and associated hardware	60	3	UEENEEE101A UEENEEE102A UEENEEE105A UEENEEE107A UETTDREL11A UETTDREL16A	UET30512	UET30712 UET40412
UETTD RTP27 A	Maintain transmission structures and associated hardware	60	3	UEENEEE101A UEENEEE102A UEENEEE105A UEENEEE107A UETTDREL11A UETTDREL16A UETTD RTP26A	UET30512	UET30712 UET40412
UETTD RTP28 A	Set-up and install transmission structure stubs	40	3	UEENEEE101A UETTDREL16A		
UETTD RTP29 A	Install and maintain transmission overhead conductors and cables	60	3	UEENEEE101A UEENEEE102A UEENEEE105A UEENEEE107A UETTDREL11A UETTDREL16A UETTD RTP26A	UET30512	UET30712 UET40412

UNIT CODE	UNIT TITLE	Wtg. Points	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				A UETTD RTP27 A		
UETTD RTP30 A	Inspect transmission overhead structures and electrical apparatus	40	3	UEENEEE101A UEENEEE107A UETTDREL11 A UETTDREL16 A	UET30512	UET30712 UET40412
UETTD RTP31 A	Maintain energised transmission lines using high voltage live work stick method	70	4	Pathway 1 Qualified and authorised Transmission Lineworker Pathway 2 BSBWOR402A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDREL11 A UETTDREL12 A UETTDREL16 A UETTD RIS54A UETTD RIS65A UETTD RTP26 A UETTD RTP27 A		UET40412

UNIT CODE	UNIT TITLE	Wtg. Points	AQ F	Prerequisites.	Qualifications Core	Qualifications Electives
				UETTD RTP29 A UETTD RTP30 A UETTD RTP99 A		
UETTD RTP32 A	Maintain energised transmission lines using high voltage live work Barehand method	70	4	Pathway 1 Qualified and authorised Transmission Lineworker Pathway 2 BSBWOR402A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101 A UEENEEG102 A UETTDREL11 A UETTDREL12 A UETTDREL16 A UETTD RIS54A UETTD RIS65A UETTD RTP26 A UETTD RTP27 A UETTD RTP29 A UETTD RTP30		UET40412

UNIT CODE	UNIT TITLE	Wtg. Points	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				A UETTD RTP31 A UETTD RTP99 A		
UETTD RTP33 A	Maintain energised transmission lines using Barehand Technique on a helicopter platform	60	4	Pathway 1 Qualified and authorised Transmission Lineworker Pathway 2 BSBWOR402A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTD RIS54A UETTD RIS65A UETTD RTP26A UETTD RTP27A UETTD RTP29A UETTD RTP30A		UET40412

UNIT CODE	UNIT TITLE	Wtg. Points	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				UETTD RTP31 A UETTD RTP32 A UETTD RTP99 A		
UETTD RTP34 A	Install/maintain overhead transmission network infrastructure	40	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006 A UEENEEG033 A UEENEEG063 A UEENEEG101 A UEENEEG102 A UEENEEG103 A UEENEEG104 A UEENEEG105 A UEENEEG106 A UEENEEG107 A UEENEEG108 A UEENEEG109 A UEENEEK142 A UETTDREL16		UET40612

UNIT CODE	UNIT TITLE	Wtg. Points	AQF	Prerequisites.	Qualifications Core	Qualifications Electives
				A UETTD RIS62A UETTD RIS63A UETTD RIS67A		
UETTD RTP35 A	Install/maintain transmission network infrastructure electrical equipment	40	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENE EG006 A UEENE EG033 A UEENE EG063 A UEENE EG101 A UEENE EG102 A UEENE EG103 A UEENE EG104 A UEENE EG105 A UEENE EG106 A UEENE EG107 A UEENE EG108 A UEENE EG109 A UEENE EK142 A UETTD REL16 A UETTD RIS62A		UET40612

UNIT CODE	UNIT TITLE	Wtg. Points	AQ F	Prerequisites.	Qualifications Core	Qualifications Electives
				UETTDRLS63A UETTDRLS67A UETTDRLTP34A		
UETTDRLTP99A	Test and verify transmission overhead installations	40	3	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRLS54A UETTDRLTP26A UETTDRLTP27A UETTDRLTP29A UETTDRLTP30A	UET30512	UET40412

2.1.11 Testing Competency Standard Units

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualifications Core	Qualifications Electives
UETTDRLTS21A	Maintain interdependent network protection and	150	5	UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A		UET50212; UET50312 UET60212 UET60312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
	control systems			UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRLS62A UETTDRLS63A UETTDRTS29A		
UETTDRTS22 A	Commission interdependent network protection and control systems	150	5	UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRLS62A UETTDRLS63A UETTDRTS21A UETTDRTS29A		UET50212; UET50312 UET60212 UET60312
UETTDRTS23 A	Conduct evaluation of power system substation	140	6	UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A		UET60212

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
	faults			UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRIS62A UETTDRIS63A		
UETTDRTS24 A	Design testing and commissioning procedures for field devices and substations	140	6	Common Group UEENEE104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRIS62A UETTDRIS63A Protection Relays and Meters Pathway		UET60212

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDRTS28A Metering Pathway UETTDRTS25A UETTDRTS26A UETTDRTS29A Primary Plant Pathway UETTDRTS29A UETTDRTS32A Protection Systems Pathway UETTDRTS21A UETTDRTS29A UETTDRTS35A		
UETTDRTS25 A	Maintain and test and metering schemes	140	5	UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRTS62A UETTDRTS63A UETTDRTS29A		UET50212; UET50312 UET60212 UET60312
UETTDRTS26	Commission	150	5	UEENEED104A		UET50212;

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
A	power systems metering schemes			UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRLS62A UETTDRLS63A UETTDRTS25A UETTDRTS29A		UET50312 UET60212 UET60312
UETTDRTS27 A	Perform accuracy checks on power systems instrument transformers	150	5	UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRLS62A UETTDRLS63A		UET50212; UET50312 UET60212 UET60312
UETTDRTS28 A	Repair, test and calibrate	150	5	UEENEEED104A UEENEEE101A		UET50212; UET50312

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
	protection relays and meters			UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRLS62A UETTDRLS63A		UET60212 UET60312
UETTDRTS29 A	Develop power systems secondary isolation instructional documents	150	5	UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRLS62A UETTDRLS63A		UET50212; UET50312 UET60212 UET60312
UETTDRTS30 A	Design power systems secondary isolation instructional	160	6	UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A		UET60212

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
	documents			UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTD RIS62A UETTD RIS63A		
UETTDRTS31 A	Maintain, test and commission power systems voltage regulating equipment	150	5	UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTD RIS62A UETTD RIS63A		UET50212; UET50312 UET60212 UET60312
UETTDRTS32 A	Conduct evaluation of power systems primary plant	160	6	UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A		UET60212

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRLS62A UETTDRLS63A UETTDRTS29A		
UETTDRTS33 A	Undertake power systems project management of substation augmentation and maintenance	180	6	Common Group UEENEEG104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRLS62A UETTDRLS63A Protection Relays and Meters Pathway UETTDRTS28A Metering Pathway		UET60212

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDRTS25A UETTDRTS26A UETTDRTS29A Primary Plant Pathway <hr/> UETTDRTS29A UETTDRTS32A Protection Systems Pathway <hr/> UETTDRTS21A UETTDRTS29A UETTDRTS35A		
UETTDRTS34 A	Install and maintain power system communication equipment	150	5	UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRTS62A UETTDRTS63A		UET50212; UET50312 UET60212 UET60312
UETTDRTS35 A	Maintain complex network protection and control systems	180	6	UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A		UET50212; UET50312 UET60212

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRLS62A UETTDRLS63A UETTDRTS21A UETTDRTS29A		
UETTDRTS36 A	Commission complex network protection and control systems	180	6	UEENEEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEG101A UEENEEG102A UEENEEG149A UETTDREL11 A UETTDREL16 A UETTDRLS62A UETTDRLS63A UETTDRTS21A UETTDRTS22A UETTDRTS29A UETTDRTS35A		UET60212
UETTDRTS37 A	Perform current injection testing	40	4	UEENEEE101A UEENEEE102A		UET40612

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
	using phantom load			UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEG171A UETTDREL11 A		
UETTDRTS38 A	Install and replace high voltage metering and associated equipment	40	4	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG076A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A		UET40612

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UEENEEG109A UEENEEG171A UETTDREL11 A UETTDREL16 A UETTDRTS37A		
UETTDRTS39 A	Maintain compliance with national electricity market metrology practices and procedures	5	30	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG076A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEG171A UETTDREL11 A UETTDREL15 A UETTDREL16 A UETTDRTS37A UETTDRTS38A		
UETTDRTS40 A	Test and maintain	5	30	UEENEEE101A UEENEEE102A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
	energy/revenue metering schemes			UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG076A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEG171A UETTDREL11 A UETTDREL15 A UETTDREL16 A UETTDRTS37A UETTDRTS38A UETTDRTS39A		
UETTDRTS41 A	Install and replace complex energy/revenue metering schemes and associated equipment	5	30	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG076A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEG171A UETTDREL11 A UETTDREL15 A UETTDREL16 A UETTDRTS37A UETTDRTS38A UETTDRTS39A UETTDRTS40A		
UETTDRTS42 A	Management of energy registration data errors for revenue billing purposes	5	30	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG076A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UEENEEG108A UEENEEG109A UEENEEG171A UETTDREL11 A UETTDREL15 A UETTDREL16 A UETTDRTS37A UETTDRTS38A UETTDRTS39A UETTDRTS40A		
UETTDRTS43 A	Commission energy/revenue metering schemes	5	30	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG076A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEG171A UETTDREL11 A UETTDREL15 A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDREL16 A UETTDRTS37A UETTDRTS38A UETTDRTS39A UETTDRTS40A UETTDRTS41A UETTDRTS42A		
UETTDRTS44 A	Test and maintain energy/revenue metering schemes (complex)	6	40	UEENEED104A UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE124A UEENEEE125A UEENEEE126A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG076A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEG149A UEENEEG171A UETTDREL11 A UETTDREL15 A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDREL16 A UETTDRLS62A UETTDRLS63A UETTDRLS37A UETTDRLS38A UETTDRLS39A UETTDRLS40A UETTDRLS41A UETTDRLS42A UETTDRLS43A		
UETTDRLS45 A	Manage compliance with national electricity market metrology practices and procedures	6	40	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG076A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEG171A UETTDREL11 A UETTDREL15 A UETTDREL16 A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDRTS37A UETTDRTS38A UETTDRTS39A UETTDRTS40A UETTDRTS41A UETTDRTS42A UETTDRTS43A		
UETTDRTS46 A	Verification and certification of revenue metering/energ y measurement instruments	6	40	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG076A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEG171A UETTDREL11 A UETTDREL15 A UETTDREL16 A UETTDRTS37A UETTDRTS38A UETTDRTS39A UETTDRTS40A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualification s Core	Qualification s Electives
				UETTDRTS41A UETTDRTS42A UETTDRTS43A		
UETTDRTS47 A	Commission energy/revenue metering schemes (complex)	6	40	UEENEE104A UEENEE101A UEENEE102A UEENEE104A UEENEE105A UEENEE107A UEENEE124A UEENEE125A UEENEE126A UEENEE137A UEENEEG006A UEENEEG033A UEENEEG063A UEENEEG076A UEENEEG101A UEENEEG102A UEENEEG103A UEENEEG104A UEENEEG105A UEENEEG106A UEENEEG107A UEENEEG108A UEENEEG109A UEENEEG149A UEENEEG171A UETTDREL11 A UETTDREL15 A UETTDREL16 A UETTDRTS62A UETTDRTS63A UETTDRTS37A		

UNIT CODE	UNIT TITLE	Wt g Pts	AQ F	Prerequisites.	Qualifications Core	Qualifications Electives
				UETTDRTS38A UETTDRTS39A UETTDRTS40A UETTDRTS41A UETTDRTS42A UETTDRTS43A UETTDRTS44A		

2.1.12 Vegetation Competency Standard Units

UNIT CODE	UNIT TITLE	AQF	Wtg Pts	Prerequisites.	Qualifications Core	Qualifications Electives
UETTDRVC21A	Use climbing techniques to cut vegetation above ground near live electrical apparatus	2	30	UEENEEE101A UETTDREL13A UETTDREL14A UETTDRVC23A UETTDRVC27A UETTDRVC33A UETTDRVC34A		UET20312
UETTDRVC22A	Reserved					
UETTDRVC23A	Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus	2	60	UEENEEE101A UETTDREL13A UETTDREL14A	UET20312	UET20612
UETTDRVC24A	Assess vegetation and recommend control measures in an ESI environment	2	80	UEENEEE101A UETTDREL13A UETTDREL14A UETTDRVC23A UETTDRVC27A		UET20312
UETTDRVC25A	Use elevated platform to	2	30	UEENEEE101A UETTDREL13A		UET20312

UNIT CODE	UNIT TITLE	AQF	Wtg Pts	Prerequisites.	Qualifications Core	Qualifications Electives
	cut vegetation above ground level near live electrical apparatus			UETTDREL14A UETTDRCVC23A UETTDRCVC27A UETTDRCVC33A		
UETTDRCVC26A	Cut vegetation at ground level near live electrical apparatus	2	60	UEENEEE101A UETTDREL13A UETTDREL14A UETTDRCVC23A UETTDRCVC27A		UET20312
UETTDRCVC27A	Monitor safety compliance of vegetation control work in an ESI environment	2	60	UEENEEE101A UETTDREL13A UETTDREL14A UETTDRCVC23A	UET20312	UET20612
UETTDRCVC28A	Reserved					
UETTDRCVC29A	Control vegetation whilst performing linework	3	40	UEENEEE101A UEENEEE102A UEENEEE104A UEENEEE105A UEENEEE107A UEENEEG101A UEENEEG102A UETTDREL11A UETTDREL12A UETTDREL16A UETTDRCIS52A UETTDRCIS54A		UET30512 UET30612 UET30712 UET40412
UETTDRCVC30A	Coordinate vegetation control operations	4		UEENEEE101A UETTDREL11A UETTDREL16A UETTDRCIS62A UETTDRCIS63A		UET40412
UETTDRCVC31A	Operate specialist equipment at	2	60	UEENEEE101A UETTDREL13A		UET20312

UNIT CODE	UNIT TITLE	AQF	Wtg Pts	Prerequisites.	Qualifications Core	Qualifications Electives
	ground level near live electrical apparatus			UETTDREL14A UETTDRCVC23A UETTDRCVC27A		
UETTDRCVC32A	Use specialised plant to cut vegetation above ground level near live electrical apparatus	2	30	UEENEEE101A UETTDREL13A UETTDREL14A UETTDRCVC23A UETTDRCVC27A UETTDRCVC33A		UET20312
UETTDRCVC33A	Apply pruning techniques to vegetation control near live electrical apparatus	2	50	UEENEEE101A UETTDREL13A UETTDREL14A UETTDRCVC23A UETTDRCVC27A		UET20312
UETTDRCVC34A	Undertake release and rescue from a tree near live electrical apparatus	2	20	UEENEEE101A UETTDREL13A UETTDREL14A UETTDRCVC23A UETTDRCVC27A		UET20312

Discipline – Imported Units

Information on Imported Units including those used as Electives in any Qualification in this Training Package can be found in – Imported Units.

The list of Imported Units is included in Table 6, below.

AHC10 Agriculture Horticulture, Conservation & Land Management

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
AHCARB202A	Fell Small Trees	30	2	Nil		UET20312
AHCARB204A	Undertake standard climbing techniques	20	2	Nil		UET20312

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
AHCARB205A	Operate and maintain chainsaws	20	2	Nil	UET20312; UET30612; UET30712	UET30512; UET30812; UET30912; UET40412
AHCCHM201A	Apply chemicals under supervision	30	2	Nil		UET20312
AHCMOM304A	Operate machinery and equipment	40	3	Nil		UET20312; UET20412
AHCPCM201A	Recognise Plants	40	2	Nil		UET20312

BSB07 Business Services Training Package

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
BSBINM401A	Implement workplace information system	40	4	Nil		UET40412; UET40512; UET40612
BSBMGT402A	Implement operational plan	40	4	Nil		UET40412; UET40512; UET40612
BSBMGT403A	Implement continuous improvement	40	4	Nil		UET40412; UET40512; UET40612
BSBWOR401A	Establish effective workplace relationships	50	4	Nil		UET40412; UET40512; UET40612
BSBWOR402A	Promote team effectiveness	50	4	Nil		UET40412; UET40512; UET40612
BSBCUS501C	Manage quality customer service	40	5	Nil		UET50212; UET50312; UET60212;

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
						UET60312
BSBFIM501A	Manage budgets and financial plans	70	5	Nil		UET50212; UET50312; UET60212; UET60312
BSBINM501A	Manage an information or knowledge management system	50	5	Nil		UET50212; UET50312; UET60212; UET60312
BSBINN502A	Build and sustain an innovative work environment	50	5	Nil		UET50212; UET50312; UET60212; UET60312
BSBLED501A	Develop a workplace learning environment	60	5	Nil		UET50212; UET50312; UET60212; UET60312
BSBMGT502B	Manage people performance	70	5	Nil		UET50212; UET50312; UET60212; UET60312
BSBMGT515A	Manage operational plan	60	5	Nil		UET50212; UET50312; UET60212; UET60312
BSBMGT516A	Facilitate continuous improvement	60	5	Nil		UET50212; UET50312; UET60212; UET60312
BSBSUS501A	Develop workplace policy and procedures for sustainability	50	5	Nil		UET50212; UET50312; UET60212; UET60312
BSBWOR501B	Manage personal work priorities and professional development	60	5	Nil		UET50212; UET50312; UET60212; UET60312
BSBWOR502B	Ensure team effectiveness	60	5	Nil		UET50212; UET50312; UET60212;

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
						UET60312

CPC08 Construction, Plumbing and Services Integrated Framework Training Package

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
CPCCCM2007A	Use explosive power tools	15	3	Nil		UET20511
CPCCLDG3001A	Licence to perform dogging	30	3	Nil	UET30512; UET30612; UET30712; UET30812; UET40412	UET30912
CPCCLHS3001A	Licence to operate a personnel and materials hoist	30	3	Nil		UET30512; UET30612; UET30712; UET30812
CPCCLHS3002A	Licence to operate a materials hoist	20	3	Nil		UET30512; UET30612; UET30712; UET30812
CPCCLRG3001A	Licence to perform rigging basic level	40	3	CPCCLRG3001A	UET30512	UET30612; UET30712; UET30812; UET40412
CPCCLRG3002A	Licence to perform rigging intermediate level	40	3	Nil		UET30512; UET30612; UET30712; UET30812
CPCCLSF2001A	Licence to erect, alter and dismantle scaffolding basic level	40	3	Nil		UET30512; UET30612; UET30712; UET30812
CPCCLSF3001A	Licence to	40	3	Nil		UET30512;

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
	erect, alter and dismantle scaffolding intermediate level					UET30612; UET30712; UET30812
CPCCOHS1001A	Work safely in the construction industry	10	2	Nil		UET20412; UET20511; UET20612

FPI11 - Forest and Forest Products Training Package

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
FPIHAR2206B	Operate a mobile chipper/mulcher	20	2	Nil		UET20312;

HLT Health Training Package

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
HLTAID001	Provide cardiopulmonary resuscitation	10	2	Nil		UET20412; UET20511
HLTAID003	Provide First Aid	10	3	Nil		UET20412

ICT10 Integrated Telecommunications Training Package

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
ICTCBL2065A	Splice and terminate optical fibre cable for carriers and service providers	40	2	Nil		UET20511
ICTCBL2068A	Install a telecommunications service to a building	60	2	Nil		UET20511

MEM05 Metal and Engineering Training Package

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
MEM16012A	Interpret technical specification and manuals	40	2	Nil		UET20612
MEM17003A	Assist in the provision of on the job training	20	2	Nil		UET20612

NWP07 Water Training Package

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
NWP218B	Perform and record sampling	20	2	Nil		UET30912
NWP261A	Operate and maintain water treatment plant and equipment	30	2	Nil		UET30912

RII Resources and Infrastructure Industry Training Package

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
RIIOHS202A	Enter and work in confined spaces	30	2	Nil		UET20511
RIIOHS204A	Work safely at heights	20	2	Nil		UET20511
RIIOHS205A	Control traffic with stop-slow bat	10	2	Nil		UET20511

TLI10 Transport and Logistics Training Package

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
TLID3035A	Operate a	30	3	Nil		UET20511

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
	boom type elevating work platform					
TLILIC2001A	Licence to operate a forklift truck	40	3	Nil		UET30512; UET30612; UET30712; UET30812
TLILIC2015B	Licence to drive medium rigid vehicle	20	3	Nil		UET30512; UET30612; UET30712; UET30812
TLILIC2016B	Licence to drive heavy rigid vehicle	20	3	Nil		UET30512; UET30612; UET30712; UET30812
TLILIC4011A	Licence to operate a slewing mobile crane (over 100 tonnes)	70	3	Nil		UET30512; UET30612; UET30712; UET30812
TLILIC0012A	License to operate a vehicle loading crane (Capacity 10 metre tonnes and above)	40	3	Nil		UET30512; UET30612; UET30712; UET30812; UET30912
TLILIC3003A	Licence to operate a bridge and gantry crane	70	3	Nil		UET30512; UET30612; UET30712; UET30812
TLILIC2005A	License to Operate a Boom Type Elevating Work Platform (Boom Length 11 Metres or more)	40	3	Nil	UET30512; UET30612; UET30712; UET30812; UET40412	UET20312; UET20412; UET20511; UET30912
TLILIC3008A	Licence to operate a	70	3	Nil		UET30512; UET30612;

Unit Code	Unit Title	Wtg Pts	AQF Level	Prerequisite/s	Qualification Core	Qualification Elective
	slewing mobile crane (up to 20 tonnes)					UET30712; UET30812
TLILIC4009A	Licence to operate a slewing mobile crane (up to 60 tonnes)	70	3	Nil		UET30512; UET30612; UET30712; UET30812

UEE11 Electrotechnology Training Package

Unit Code	Unit Title	Wt g Pts	AQ F Leve l	Prerequisite/s	Qualificati on Core	Qualificati on Elective
UEENEEC001B	Maintain documentation	20	3	Nil		UET20511 ; UET20612
UEENEEC005B	Estimate electrotechnology projects	40	5	Nil		UET50212
UEENEEC006B	Prepare tender submissions for electrotechnology projects	60	5	UEENEEC005B		UET50212
UEENEEC008B	Receive and store equipment and materials for electrotechnology work	20	2	Nil		UET20511
UEENEEC010B	Deliver a service to customers	20	2	Nil		UET20511 ; UET20612
UEENEED101A	Use computer applications relevant to a workplace	20	2	Nil		UET20612
UEENEED104A	Use software for engineering applications	40	3	Nil	UET50212 ; UET50312 ; UET60212	

Unit Code	Unit Title	Wt g Pts	AQ F Leve l	Prerequisite/s	Qualificati on Core	Qualificati on Elective
					; UET60312	
UEENEED11 7A	Install and configure Internetworking systems	12 0	4	Nil		UET60212 ; UET60312
UEENEEE083 A	Establish and follow a competency development plan in an electrotechnology engineering discipline	12 0	6	Nil	UET60212 UET60312	
UEENEEE101 A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20	2	Nil	UET20312 ; UET20412 ; UET20612 ; UET30512 ; UET30612 ; UET30712 ; UET30812 ; UET30912 ; UET40412 ; UET40512 ; UET40612 ; UET50212 ; UET50312 ; UET60212 ; UET60312	
UEENEEE102 A	Fabricate, dismantle, assemble of utilities	40	2	UEENEEE101 A	UET30512 ; UET30612	UET50312 ; UET60312

Unit Code	Unit Title	Wt g Pts	AQ F Level	Prerequisite/s	Qualificati on Core	Qualificati on Elective
	industry components				; UET30712 ; UET30812 ; UET30912 ; UET40412 ; UET40512 ; UET40612 ; UET50212 ; UET60212	
UEENEEE103 A	Solve problems in ELV single path circuits	40	2	Nil	UET30912	UET20511
UEENEEE104 A	Solve problems in d.c. circuits	80	3	UEENEEE101 A	UET30512 ; UET30612 ; UET30712 ; UET30812 ; UET40412 ; UET40512 ; UET40612 ; UET50212 ; UET50312 ; UET60212 ; UET60312	
UEENEEE105 A	Fix and secure electrotechnology equipment	20	2	UEENEEE101 A	UET30512 ; UET30612	

Unit Code	Unit Title	Wt g Pts	AQ F Leve l	Prerequisite/s	Qualificati on Core	Qualificati on Elective
					; UET30712 ; ; UET30812 ; ; UET30912 ; ; UET40412 ; ; UET40512 ; ; UET40612	
UEENEEE107 A	Use drawings, diagrams, schedules, standards, codes and specifications	40	3	UEENEEE101 A	UET30512 ; ; UET30612 ; ; UET30712 ; ; UET30812 ; ; UET30912 ; ; UET40412 ; ; UET40512 ; ; UET40612 ; ; UET50212 ; ; UET50312 ; ; UET60212 ; ; UET60312	
UEENEEE108 A	Lay wiring/cabling and terminate accessories for ELV circuits	40	2	UEENEEE105 A UEENEEE107 A		UET30512 ; ; UET30612 ; ; UET30712 ; ; UET30812

Unit Code	Unit Title	Wt g Pts	AQ F Level	Prerequisite/s	Qualificati on Core	Qualificati on Elective
UEENEEE124 A	Compile and produce an electrotechnology/ utilities report	60	4	Nil	UET50212 ; UET50312 ; UET60212 ; UET60312	
UEENEEE125 A	Provide engineering solutions for problems in complex multiple path circuits problems	60	5	UEENEEE126 A	UET50212 ; UET50312 ; UET60212 ; UET60312	
UEENEEE126 A	Provide solutions to basic engineering computational problems	60	5	UEENEEG102 A	UET50212 ; UET50312 ; UET60212 ; UET60312	
UEENEEE137 A	Document and apply measures to control OHS risks associated with electrotechnology work	20	2	UEENEEE101 A	UET30912 ; UET40512 ; UET40612	
UEENEEE151 A	Transport apparatus, equipment and materials	60	2	Nil		UET20511
UEENEEE190 A	Prepare engineering drawings using manual drafting and CAD for electrotechnology/utiliti es applications	60	3	UEENEEED104 A; UEENEEE101 A; UEENEEE102 A; UEENEEE107 A		
UEENEEE191 A	Prepare electrotechnology/utiliti es drawings using manual drafting and	60	3	UEENEEED104 A; UEENEEE101 A;		UET50212

Unit Code	Unit Title	Wt g Pts	AQ F Leve l	Prerequisite/s	Qualificati on Core	Qualificati on Elective
	CAD equipment and software			UEENEEE102 A; UEENEEE104 A; UEENEEE107 A; UEENEEE190 A		
UEENEEE192 A	Produce detailed electrotechnology /utilities drawings using computer aided design equipment and software	60	4	UEENEEED104 A; UEENEEE101 A; UEENEEE102 A; UEENEEE104 A; UEENEEE107 A; UEENEEE190 A; UEENEEE191 A		UET50212
UEENEEF106 A	Solve problems in voice and data communications circuits	40	2	UEENEEE101 A		UET20511
UEENEEF107 A	Set up and configure the wireless capabilities of communications and data storage devices	40	2	UEENEEE101 A		UET20511
UEENEEG00 6A	Solve problems in single and three phase low voltage machines	80	3	UEENEEE101 A; UEENEEE102 A; UEENEEE104 A; UEENEEE105 A; UEENEEE107 A; UEENEEG101	UET40512 ; UET40612	UET50212 ; UET50312 ; UET60212 ; UET60312

Unit Code	Unit Title	Wt g Pts	AQ F Level	Prerequisite/s	Qualificati on Core	Qualificati on Elective
				A; UEENEEG102 A; UEENEEG106 A		
UEENEEG03 3A	Solve problems in single and three phase low voltage electrical apparatus and circuits	60	3	UEENEEG102 A	UET40512 ; UET40612	
UEENEEG06 3A	Arrange circuits, control and protection for general electrical installations	40	3	UEENEEG102 A	UET40512 ; UET40612	
UEENEEG07 6A	Install and replace low voltage current transformer metering	20	4	UEENEEG105 A		UET40612
UEENEEG10 1A	Solve problems in electromagnetic devices and related circuits	60	3	UEENEEG104 A	UET30512 ; UET30612 ; UET30712 ; UET30812 ; UET40412 ; UET40512 ; UET40612 ; UET50212 ; UET50312 ; UET60212 ; UET60312	
UEENEEG10 2A	Solve problems in low voltage a.c. circuits	80	3	UEENEEG101 A	UET30512 ; UET30612 ;	

Unit Code	Unit Title	Wt g Pts	AQ F Leve l	Prerequisite/s	Qualificati on Core	Qualificati on Elective
					UET30712 ; UET30812 ; UET40412 ; UET40512 ; UET40612 ; UET50212 ; UET50312 ; UET60212 ; UET60312	
UEENEEG10 3A	Install low voltage wiring and accessories	20	3	UEENEEE101 A; UEENEEE102 A; UEENEEE104 A; UEENEEE105 A; UEENEEE107 A; UEENEEE137 A; UEENEEG006 A; UEENEEG033 A; UEENEEG063 A; UEENEEG101 A; UEENEEG102 A; UEENEEG106 A;	UET40512 ; UET40612	

Unit Code	Unit Title	Wt g Pts	AQ F Level	Prerequisite/s	Qualificati on Core	Qualificati on Elective
				UEENEEG107 A; UEENEEG108 A; UEENEEG109 A		
UEENEEG10 4A	Install appliances, switchgear and associated accessories for low voltage electrical installations	20	3	UEENEEE101 A; UEENEEE102 A; UEENEEE104 A; UEENEEE105 A; UEENEEE107 A; UEENEEE137 A; UEENEEG006 A; UEENEEG033 A; UEENEEG063 A; UEENEEG101 A; UEENEEG102 A; UEENEEG106 A; UEENEEG107 A; UEENEEG108 A; UEENEEG109 A	UET40512 ; UET40612	
UEENEEG10 5A	Verify compliance and functionality of low voltage general	40	3	UEENEEE101 A; UEENEEE102	UET40512 ; UET40612	

Unit Code	Unit Title	Wt g Pts	AQ F Level	Prerequisite/s	Qualificati on Core	Qualificati on Elective
	electrical installations			A; UEENEEE104 A; UEENEEE105 A; UEENEEE107 A; UEENEEE137 A; UEENEEG006 A; UEENEEG033 A; UEENEEG063 A; UEENEEG101 A; UEENEEG102 A; UEENEEG103 A UEENEEG104 A UEENEEG106 A; UEENEEG107 A; UEENEEG108 A; UEENEEG109 A		
UEENEEG10 6A	Terminate cables, cords and accessories for low voltage circuits	40	3	UEENEEE101 A; UEENEEE102 A; UEENEEE105 A; UEENEEE107 A	UET40512 ; UET40612	UET30512 ; UET30612 ; UET30712 ; UET30812

Unit Code	Unit Title	Wt g Pts	AQ F Leve l	Prerequisite/s	Qualificati on Core	Qualificati on Elective
UEENEEG10 7A	Select wiring systems and cables for low voltage general electrical installations	60	3	UEENEEE101 A; UEENEEE102 A; UEENEEE104 A; UEENEEE105 A; UEENEEE107 A; UEENEEG006 A; UEENEEG033 A; UEENEEG063 A; UEENEEG101 A; UEENEEG102 A; UEENEEG106 A	UET40512 ; UET40612	
UEENEEG10 8A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	40	3	UEENEEE101 A; UEENEEE102 A; UEENEEE104 A; UEENEEE105 A; UEENEEE107 A; UEENEEG006 A; UEENEEG033 A; UEENEEG063 A; UEENEEG101	UET40512 ; UET40612	

Unit Code	Unit Title	Wt g Pts	AQ F Level	Prerequisite/s	Qualificati on Core	Qualificati on Elective
				A; UEENEEG102 A; UEENEEG106 A		
UEENEEG109A	Develop and connect electrical control circuits	80	3	UEENEEE101 A; UEENEEE102 A; UEENEEE104 A; UEENEEE105 A; UEENEEE107 A; UEENEEG006 A; UEENEEG063 A; UEENEEG101 A; UEENEEG102 A; UEENEEG106 A	UET40512 ; UET40612	
UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits	60	5	UEENEEE125 A; UEENEEG102 A	UET50212 ; UET50312 ; UET60212 ; UET60312	
UEENEEG171A	Install, set up and commission interval metering	20	3	UEENEEG104 A		UET40612

Unit Code	Unit Title	Wt g Pts	AQ F Level	Prerequisite/s	Qualificati on Core	Qualificati on Elective
UEENEEG19 1A	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software	60	3	UEENEEG104 A; UEENEEE101 A; UEENEEE102 A; UEENEEE104 A; UEENEEE107 A; UEENEEG190 A		UET50212
UEENEEG19 2A	Produce detailed electrotechnology /utilities drawings using computer aided design equipment and software	60	4	UEENEEG104 A; UEENEEE101 A; UEENEEE102 A; UEENEEE104 A; UEENEEE107 A; UEENEEG190 A; UEENEEG191 A		UET50212
UEENEEH10 2A	Repair basic electronic apparatus faults by replacement of components	40	2	UEENEEE101 A; UEENEEE102 A		UET50212 ; UET50312 ; UET60212 ; UET60312
UEENEEH11 2A	Troubleshoot digital sub-systems	80	3	UEENEEE101 A; UEENEEH102 A		UET50212 ; UET50312 ; UET60212 ; UET60312
UEENEEH13	Troubleshoot basic	40	3	UEENEEH102		UET50212

Unit Code	Unit Title	Wt g Pts	AQ F Level	Prerequisite/s	Qualificati on Core	Qualificati on Elective
9A	amplifier circuits			A; UEENEEH114 A; UEENEEE101 A UEENEEE102 A; UEENEEE104 A OR UEENEEH169 A OR UEENEEG102 A; UEENEEE101 A; UEENEEE104 A		; UET50312 ; UET60212 ; UET60312
UEENEEI155 A	Develop structured programs to control external devices	40	4	UEENEEE101 A		UET50212 ; UET50312 ; UET60212 ; UET60312
UEENEEI156 A	Develop and test code for microcontroller devices	60	5	UEENEEE101 A		UET60212 UET60312
UEENEEK10 1A	Maintain safety and tidiness of remote area power supply systems	20	2	UEENEEE101 A; UEENEEK102 A	UET30912	
UEENEEK10 2A	Work safely with remote area power supply systems	20	2	UEENEEE101 A	UET30912	
UEENEEK10 3A	Conduct periodic maintenance of remote area power supply battery banks	40	2	UEENEEE101 A; UEENEEE102 A; UEENEEE103 A;		UET30912

Unit Code	Unit Title	Wt g Pts	AQ F Level	Prerequisite/s	Qualificati on Core	Qualificati on Elective
				UEENEEE107 A; UEENEEK101 A; UEENEEK102 A		
UEENEEK104A	Conduct periodic maintenance of remote area power supply generator sets	40	2	UEENEEE101 A; UEENEEE102 A; UEENEEE103 A; UEENEEE107 A; UEENEEK101 A; UEENEEK102 A		UET30912
UEENEEK105A	Conduct periodic maintenance of remote area power supply photo voltaic arrays	40	2	UEENEEE101 A; UEENEEE102 A; UEENEEE103 A; UEENEEE107 A; UEENEEK101 A; UEENEEK102 A		UET30912
UEENEEK106A	Conduct periodic maintenance of remote area power supply wind generators	40	2	UEENEEE101 A; UEENEEE102 A; UEENEEE103 A; UEENEEE107 A; UEENEEK101 A; UEENEEK102 A		UET30912

Unit Code	Unit Title	Wt g Pts	AQ F Level	Prerequisite/s	Qualificati on Core	Qualificati on Elective
UEENEEK11 6A	Maintain and monitor remote area power Generation facilities	80	2	UEENEEE101 A; UEENEEE102 A; UEENEEE103 A; UEENEEE107 A; UEENEEK101 A; UEENEEK102 A; UEENEEK104 A	UET30912	
UEENEEK12 0A	Maintain operation of remote area power Generation plant	120	2	UEENEEE101 A; UEENEEE102 A; UEENEEE103 A; UEENEEK116 A	UET30912	
UEENEEK14 2A	Apply environmental and sustainable procedures in the energy sector	20	2	Nil	UET20511 ; UET40512 ; UET40612	
UEENEER00 1A	Contribute to the planning of a research	120	5	Nil		UET50212
UEENEEP024 A	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply	20	2	UEENEEE101 A		UET30912
UEENEEP026 A	Conduct in-service safety testing of electrical cord assemblies and cord connected appliances/equipment	20	2	UEENEEE101 A		UET30912

Unit Code	Unit Title	Wt g Pts	AQ F Leve l	Prerequisite/s	Qualificati on Core	Qualificati on Elective
	project					
UEENEER00 2A	Contribute to the conduct of a research project	12 0	5	Nil		UET50212
UEENEER00 3A	Contribute to the development of a product/application/ service	12 0	5	Nil		UET50212
UEENEER00 4A	Contribute to the trial of a product/Application/Ser vice	12 0	5	Nil		UET50212

1.2.10 Unit Relationships

2.10 Unit Relationships

Prerequisites and co requisites of each Competency Standard Unit can be obtained from the following Table 2. The correlation of the units within a qualification(s) can be found in flowcharts diagrams located in Volume 1 Part 1 Qualification Framework

The units in Table 2 are listed in alphabetical order and include their relationship to the previous Training Package and their prerequisite and co requisite requirements.

CSU relationship to former Training Package and prerequisites

Included in this Training Package is a summary of:

- Competency Standard Units in the Electricity Supply Industry - Transmission, Distribution and Rail Training Package;
- The relationship to former Competency Standard Units
- Comments to units in the former Training Package;
- AQF alignment and weighting points of each Competency Standard Unit; and
- the Pre-requisite requirements.

Note:

1. The following is a guide to assist RTOs in granting equivalent units when implementing this Training Package.
2. The alignment of more than one UET unit to a UTT unit does not necessarily mean that the one UTT unit is equivalent to all aligned UET units.
3. RTOs shall ensure appropriate analysis of all the skills and knowledge specified in the respective Competency Standard Units in this Training Package is undertaken with that of the former Training Package (UTT98), in determining equivalence.
4. In granting an equivalence of UET unit for a UTT unit;
5. the prerequisite units specified for the UET unit shall be included, and the critical aspects of evidence of the UET unit and its specified prerequisite units shall be at least equal to that of the UTT unit.

Table 1 — Mapping Units of Standard Competency UET12 ESI – Transmission, Distribution and Rail Sector Training Package Version 1 and UET09 ESI - Transmission, Distribution and Rail Sector Training Package Version 3

2.1.1 Cable Jointing Competency Standard Units

UET12 Unit Code	UET12 Unit Title	UET09 Unit Code – V3	UET09 Unit Title – V3	E = Equivalent N = Not Equivalent
UETTDRCJ21A	Lay ESI electrical	UETTDRCJ01B	Lay electrical cables	E

	cables			
UETTDRCJ22A	Install and maintain de-energised low voltage underground paper insulated cables.	UETTDRCJ02B	Install and maintain de-energised LV underground paper insulated cables.	E
UETTDRCJ23A	Install and maintain de-energised high voltage underground paper insulated cables.	UETTDRCJ03B	Install and maintain de-energised HV underground paper insulated cables.	E
UETTDRCJ24A	Joint and maintain energised low voltage underground paper insulated cables	UETTDRCJ04B	Joint and maintain energised LV underground paper insulated cables	E
UETTDRCJ25A	Perform straight through high voltage paper insulated to polymeric transition joint	UETTDRCJ05B	Perform straight through HV paper insulated to polymeric transition joint	E
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.	UETTDRCJ06B	Install and maintain de-energised LV underground polymeric cables.	E
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.	UETTDRCJ07B	Install and maintain de-energised HV underground polymeric cables.	E
UETTDRCJ28A	Joint and maintain energised low voltage underground polymeric cables	UETTDRCJ08B	Joint and maintain energised LV underground polymeric cables	E
UETTDRCJ29A	Install gas and oil filled specialised underground cables	UETTDRCJ09B	Install oil and gas filled specialised underground cables	E
UETTDRCJ30A	Maintain gas and oil filled specialised underground cables	UETTDRCJ10B	Maintain oil and gas filled specialised underground cables	E
UETTDRCJ31A	Install and maintain specialised polymeric underground cables	UETTDRCJ11B	Install and maintain polymeric specialised underground cables	E

UETTDRCJ32A	Install and maintain gas and oil pressure systems for specialised underground cables	UETTDRCJ12B	Install and maintain oil & gas pressure systems for specialised underground cables	E
UETTDRCJ33A	Install and maintain network infrastructure low voltage underground cables	UETTDRCJ13B	Install and maintain network infrastructure LV underground cables	E
UETTDRCJ34A	Install and maintain network infrastructure high voltage underground cables	UETTDRCJ14B	Install and maintain network infrastructure HV underground cables	E
UETTDRCJ99A	Test and verify distribution cable jointing installations	New Unit	New Unit	

2.1.2 Distribution Competency Standard Units

UET12 Unit Code	UET12 Unit Title	UET09 Unit Code – V3	UET09 Unit Title – V3	E = Equivalent N = Not Equivalent
UETTDSDP11A	Inspect overhead poles/structures and electrical apparatus	UETTDSDP01B	Inspect overhead structures and electrical apparatus (poles /structures)	E
UETTDSDP12A	Maintain overhead energised low voltage conductors and cables	UETTDSDP02B	Maintain overhead energised LV conductors and cables	E
UETTDSDP13A	Maintain energised HV distribution overhead electrical apparatus (stick)	UETTDSDP03B	Maintain energised high voltage distribution overhead electrical apparatus (stick)	E
UETTDSDP14A	Maintain energised HV distribution overhead electrical apparatus (glove)	UETTDSDP04B	Maintain energised high voltage distribution overhead electrical apparatus (glove)	E

UETTDRDP15A	Inspect, maintain and restore energised low voltage overhead distribution network infrastructure	UETTDRDP05B	Inspect, maintain and restore energised LV overhead distribution network infrastructure	E
UETTDRDP99A	Test and verify distribution overhead installations	New Unit	New Unit	

2.1.3 Design Competency Standard Units

UET12 Unit Code	UET12 Unit Title	UET09 Unit Code – V3	UET09 Unit Title – V3	E = Equivalent N = Not Equivalent
UETTDRDS31A	Draft and layout an power system overhead distribution extension	UETTDRDS01B	Draft and layout an overhead distribution extension	E
UETTDRDS32A	Draft and layout an power system underground distribution extension	UETTDRDS02B	Draft and layout an underground distribution extension	E
UETTDRDS33A	Draft and layout a power system street lighting system	UETTDRDS03B	Draft and layout a street lighting system	E
UETTDRDS34A	Draft and layout a power system distribution substation minor upgrade	UETTDRDS04B	Draft and layout a distribution substation minor upgrade	E
UETTDRDS35A	Design overhead distribution power systems	UETTDRDS05B	Design overhead distribution systems	E
UETTDRDS36A	Design underground distribution power systems	UETTDRDS06B	Design underground distribution systems	E
UETTDRDS37A	Design power system distribution substations	UETTDRDS07B	Design distribution substations	E

UETTD RDS38A	Design power system public lighting systems	UETTD RDS08B	Design public lighting systems	E
UETTD RDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure	UETTD RDS09B	Prepare and manage detailed construction plans for electrical system infrastructure	E
UETTD RDS40A	Prepare and appraise power systems financial impact statements	UETTD RDS10B	Prepare and appraise financial impact statements	E
UETTD RDS41A	Manage electrical power systems infrastructure projects	UETTD RDS11B	Manage electrical infrastructure projects	E
UETTD RDS42A	Investigate quality of power systems supply issues	UETTD RDS12B	Investigate quality of supply issues	E
UETTD RDS43A	Develop high voltage and low voltage distribution protection systems	UETTD RDS13B	Develop HV and LV distribution protection systems	E
UETTD RDS44A	Design power system zone substations modifications	UETTD RDS14B	Design zone substations modifications	E
UETTD RDS45A	Organise and implement ESI line and easement surveys	UETTD RDS15B	Organise and implement line and easement surveys	E
UETTD RDS46A	Develop planned power systems outage strategies	UETTD RDS16B	Develop planned outage strategies	E
UETTD RDS47A	Review power system asset management strategies	UETTD RDS17B	Review asset management strategies	E
UETTD RDS48A	Analyse and appraise power system fault and outage data	UETTD RDS18B	Analyse and appraise fault and outage data	E
UETTD RDS49A	Establish and manage power system geographical information systems	UETTD RDS19B	Establish and manage geographical information systems	E

	data		data	
UETTD RDS50A	Design customer power system substations	UETTD RDS20B	Design customer substations	E
UETTD RDS51A	Manage power system transmission and sub-transmission design process	UETTD RDS21B	Manage transmission and sub-transmission design process	E
UETTD RDS52A	Design power system transmission, sub-transmission and zone substation buildings	UETTD RDS22B	Design transmission, sub-transmission and zone substation buildings	E
UETTD RDS53A	Design power system transmission and sub-transmission substation primary plant	UETTD RDS23B	Design transmission and sub-transmission substation primary plant	E
UETTD RDS54A	Design power system transmission and sub-transmission protection and control	UETTD RDS24B	Design transmission and sub-transmission protection and control	E
UETTD RDS55A	Design power system transmission and sub-transmission substation earthing	UETTD RDS25B	Design transmission and sub-transmission substation earthing	E
UETTD RDS56A	Design power system transmission, sub-transmission and zone substation – civil and structural components	UETTD RDS26B	Design transmission, sub-transmission and zone substation – civil and structural components	E
UETTD RDS57A	Design power system overhead transmission systems	UETTD RDS27B	Design overhead transmission systems	E
UETTD RDS58A	Design underground transmission systems	UETTD RDS28B	Design underground transmission systems	E

2.1.4 Entry Level Cross Discipline Competency Standard Units

UET12 Unit	UET12 Unit Title	UET09 Unit	UET09 Unit Title – V3	E =
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Code		Code – V3		Equivalent N = Not Equivalent
UETTDREL11A	Apply sustainable energy and environmental procedures	UETTDREL01B	Apply environmental and sustainable energy procedures	E
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus	UETTDREL02B	Operate plant and equipment near live electrical conductors/apparatus	E
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures	UETTDREL03B	Comply with environmental and incidental response procedures	E
UETTDREL14A	Working safely near live electrical apparatus as a non-electrical worker	UETTDREL04B	Working safely near live electrical apparatus as non electrical worker	E
UETTDREL15A	Respond to power systems technical enquiries and requests	UETTDREL05B	Respond to technical enquiries and requests	E
UETTDREL16A	Working safely near live electrical apparatus	New Unit	New Unit	
UETTDREL17A	Operate asset inspection machinery and equipment near live electrical apparatus	New Unit	New Unit	
UETTDREL18A	Inspect and treat poles and inspect electrical apparatus	New Unit	New Unit	
UETTDREL19A	Identify and interpret characteristics of electrical apparatus	New Unit	New Unit	

	associated with power industry assets			
UETTDREL20A	Undertake minor vegetation control and routine minor maintenance of poles and electrical apparatus	New Unit	New Unit	
UETTDREL21A	Operate specialised data information equipment near live electrical apparatus	New Unit	New Unit	

2.1.5 Industry Specific Cross Discipline Competency Standard Units

UET12 Unit Code	UET12 Unit Title	UET09 Unit Code – V3	UET09 Unit Title – V3	E = Equivalent N = Not Equivalent
UETTDRLS32A	Solve electrical problems in remote community network apparatus	New Unit	New Unit	
UETTDRLS33A	Solve electrical problems in remote community network systems	New Unit	New Unit	
UETTDRLS34A	Install and replace energy meters and associated equipment in remote communities	New Unit	New Unit	
UETTDRLS35A	Perform remote community network field switching to a given schedule	New Unit	New Unit	
UETTDRLS36A	Install and maintain low voltage services in remote communities	New Unit	New Unit	

	(overhead)			
UETTDRIS37A	Install and maintain low voltage services in remote communities (underground)	New Unit	New Unit	
UETTDRIS38A	Install and maintain public lighting systems in remote communities	New Unit	New Unit	
UETTDRIS41A	Install network infrastructure electrical equipment	UETTDRIS01B	Install electrical equipment (network infrastructure).	E
UETTDRIS42A	Maintain network infrastructure electrical equipment	UETTDRIS02B	Maintain electrical equipment (Network Infrastructure).	E
UETTDRIS43A	Perform low voltage field switching operation to a given schedule.	UETTDRIS03B	Perform LV field switching operation to a given schedule.	E
UETTDRIS44A	Perform HV field switching operation to a given schedule	UETTDRIS04B	Perform high voltage field switching operation to a given schedule	E
UETTDRIS45A	Install and maintain ESI overhead distribution network infrastructure	UETTDRIS27B	Install and maintain overhead distribution network infrastructure	E
UETTDRIS46A	Install and maintain ESI network infrastructure electrical equipment	UETTDRIS06B	Install and maintain network infrastructure electrical equipment	E
UETTDRIS47A	Sample, filter, test and reinstate insulating oil	UETTDRIS07B	Sample, test, filter, and reinstate insulating oil	E
UETTDRIS48A	Develop high voltage switching schedule	UETTDRIS08B	Develop HV switching schedule	E
UETTDRIS49A	Develop low voltage switching schedule	UETTDRIS09B	Develop LV switching schedule	E
UETTDRIS50A	Coordinate power system permit procedures	UETTDRIS10B	Coordinate permit procedures	E

UETTDRIS51A	Coordinate and direct power system switching schedules	UETTDRIS11B	Coordinate and direct switching schedules	E
UETTDRIS52A	Install and maintain poles, structures and associated hardware	UETTDRIS12B	Install and maintain poles/structures and associated hardware	E
UETTDRIS53A	Install and maintain power system public lighting	UETTDRIS13B	Install and maintain public lighting systems	E
UETTDRIS54A	Install and maintain poles, structures, overhead conductors and cables	UETTDRIS14B	Install and maintain overhead conductors and cables (poles and structures)	E
UETTDRIS55A	Install and maintain low voltage underground services	UETTDRIS15B	Install and maintain low voltage services (underground)	E
UETTDRIS56A	Install and maintain low voltage overhead services	UETTDRIS16B	Install and maintain low voltage services (overhead)	E
UETTDRIS57A	Conduct visual checking and treatment of power system poles and structures	UETTDRIS17B	Conduct visual checking and treatment of poles and structures	E
UETTDRIS58A	Locate faults in power system underground power cables	UETTDRIS18B	Locate faults in underground power cables	E
UETTDRIS59A	Conduct high potential testing of power system underground power cables	UETTDRIS19B	Conduct high potential testing of underground power cables	E
UETTDRIS60A	Install and replace power system energy meters and associated equipment	UETTDRIS20B	Install and replace energy meters and associated equipment	E
UETTDRIS61A	Install mobile Generation set for synchronised LV Genset	UETTDRIS21B	Install mobile Generation set for synchronised Genset LV	E
UETTDRIS62A	Implement and monitor the power system organisational	UETTDRIS22B	Implement and monitor the organisational OHS	E

	OHS policies, procedures and programs		policies, procedures and programs	
UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures	UETTDRIS23B	Implement and monitor environmental and sustainable energy management policies and procedures	E
UETTDRIS64A	Install mobile Generation set for synchronised HV Genset	UETTDRIS24B	Install mobile Generation set for synchronised genset HV	E
UETTDRIS65A	Contribute to coordinated HV live working	UETTDRIS25B	Contribute to coordinated high voltage live line work	E
UETTDRIS66A	Manage an electricity power system OHS management system	UETTDRIS26B	Manage an electricity supply industry OHS management system	E
UETTDRIS67A	Solve problems in energy supply network equipment	New Unit	New Unit	
UETTDRIS68A	Solve problems in energy supply network protection equipment and systems	New Unit	New Unit	
UETTDRIS69A	Diagnose and rectify faults in energy supply apparatus	New Unit	New Unit	
UETTDRIS70A	Diagnose and rectify faults in electrical energy distribution systems	New Unit	New Unit	
UETTDRIS71A	Diagnose and rectify faults in electrical energy supply transmission systems	New Unit	New Unit	
UETTDRIS72A	Diagnose and rectify faults in distributed Generation systems	New Unit	New Unit	
UETTDRIS73A	Develop engineering	New Unit	New Unit	

	solutions for energy supply power transformer problems			
UETTDRI574A	Develop engineering solutions for energy supply system protection problems	New Unit	New Unit	
UETTDRI599A	Test and verify distribution remote area installations	New Unit	New Unit	

2.1.6 Refresher Training Competency Standard Units

UET12 Unit Code	UET12 Unit Title	UET09 Unit Code – V3	UET09 Unit Title – V3	E = Equivalent N = Not Equivalent
UETTDRRF01B	Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus	UETTDRRF01A	Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus	E
UETTDRRF02B	Perform pole top rescue	UETTDRRF02A	Perform pole top rescue	E
UETTDRRF03B	Perform EWP rescue	UETTDRRF03A	Perform EWP rescue	E
UETTDRRF04B	Perform tower rescue	UETTDRRF04A	Perform tower rescue	E
UETTDRRF05B	Perform rescue from switchyard structures at heights	UETTDRRF05A	Perform rescue from switchyard structures at heights	E
UETTDRRF06B	Perform rescue from a live LV panel	UETTDRRF06A	Perform rescue from a live LV panel	E
UETTDRRF07B	Perform cable pit/trench/excavation rescue	UETTDRRF07A	Perform cable pit/trench/excavation rescue	E
UETTDRRF08B	Perform EWP controlled descent escape	UETTDRRF08A	Perform EWP controlled descent escape	E
UETTDRRF09B	Apply access procedures to work on or near electrical	UETTDRRF09A	Apply access procedures to work on or near electrical	E

	network infrastructure		network infrastructure	
UETDRRF10B	Provide first aid in an ESI environment	UETDRRF10A	Provide first aid in an ESI environment	E
UETDRRF11A	Testing of connections to low voltage electricity networks	New Unit	New Unit	

2.1.7 Rail Traction Competency Standard Units

UET12 Unit Code	UET12 Unit Title	UET09 Unit Code – V3	UET09 Unit Title – V3	E = Equivalent N = Not Equivalent
UETDRRT21A	Install traction overhead wiring systems	UETDRRT01B	Install overhead traction wiring systems	E
UETDRRT22A	Maintain traction overhead wiring systems	UETDRRT02B	Maintain overhead traction wiring systems	E
UETDRRT23A	Install rail traction bonds	UETDRRT03B	Install traction bonds	E
UETDRRT24A	Maintain rail traction bonds	UETDRRT04B	Maintain traction bonds	E
UETDRRT25A	Install overhead rail traction configurations	UETDRRT05B	Install overhead traction configurations	E
UETDRRT26A	Maintain overhead rail traction configurations	UETDRRT06B	Maintain overhead traction configurations	E
UETDRRT27A	Install overhead traction components and equipment	UETDRRT07B	Install overhead traction equipment and components	E
UETDRRT28A	Maintain overhead traction components and equipment	UETDRRT08B	Maintain overhead traction equipment and components	E
UETDRRT29A	Operate rail road traction height access equipment.	UETDRRT09B	Operate road rail traction height access equipment.	E
UETDRRT30A	Perform to a given	UETDRRT10B	Perform rail	E

	schedule rail traction switching operations		traction switching operations to a given schedule	
UETDRRT31A	Maintain energised d.c. traction overhead wiring system	UETDRRT11B	Maintain energised direct current traction overhead wiring system	E
UETDRRT32A	Maintain energised traction overhead electrical apparatus using stick techniques	UETDRRT12B	Maintain energised traction overhead electrical apparatus (stick)	E
UETDRRT33A	Maintain energised traction overhead electrical apparatus using glove techniques	UETDRRT13B	Maintain energised traction overhead electrical apparatus (glove)	E
UETDRRT34A	Install and maintain traction network wiring systems	UETDRRT14B	Install and maintain traction network wiring systems	E
UETDRRT35A	Install and maintain traction network equipment and components	UETDRRT15B	Install and maintain traction network equipment and components	E
UETDRRT36A	Maintain traction network wiring systems	New Unit	New Unit	
UETDRRT37A	Maintain traction network components and equipment	New Unit	New Unit	
UETDRRT99A	Test and verify rail traction installations	New Unit	New Unit	

2.1.8 Substation Competency Standard Units

UET12 Unit Code	UET12 Unit Title	UET09 Unit Code – V3	UET09 Unit Title – V3	E = Equivalent N = Not Equivalent
UETDRSB21A	Diagnose and rectify faults in substation environment	UETDRSB01B	Diagnose and rectify faults in power system substation	E

			environment	
UETTDRSB22A	Carry out power systems substation inspection	UETTDRSB02B	Carry out substation inspection	E
UETTDRSB23A	Install and maintain substation direct current systems	UETTDRSB03B	Install and maintain substation DC systems	E
UETTDRSB24A	Maintain high voltage power system circuit breakers	UETTDRSB04B	Maintain HV power system breakers	E
UETTDRSB25A	Maintain high voltage power and instrument transformers	UETTDRSB05B	Maintain HV power system – transformers and instrument transformers	E
UETTDRSB26A	Install high current DC equipment and switchgear	UETTDRSB06B	Install high current DC switchgear and equipment	E
UETTDRSB27A	Maintain high current DC equipment and switchgear	UETTDRSB07B	Maintain high current DC switchgear and equipment	E
UETTDRSB29A	Maintain capacitor bank equipment for voltage regulation	UETTDRSB09B	Maintain voltage regulating equipment – capacitor banks	E
UETTDRSB30A	Maintain high voltage power system static VAR compensators (SVC)	UETTDRSB10B	Maintain HV power system static VAR compensators	E
UETTDRSB31A	Maintain high voltage power system synchronous condensers	UETTDRSB11B	Maintain HV power system synchronous condensers	E
UETTDRSB32A	Maintain power transformer on load tap changers (OLTC)	UETTDRSB12B	Maintain voltage regulating equipment – on load tapchangers	E
UETTDRSB33A	Install high voltage plant and equipment	UETTDRSB13B	Install HV plant and equipment	E
UETTDRSB34A	Carry out surveys using thermovision	UETTDRSB14B	Carry out Thermovision	E

	techniques		surveys	
UETTDRSB35A	Maintain discrete control and protection systems	UETTDRSB15B	Maintain discrete protection and control systems	E
UETTDRSB36A	Commission discrete control and protection systems	UETTDRSB16B	Commission discrete protection and control systems	E
UETTDRSB37A	Maintain power system distribution field devices	UETTDRSB17B	Maintain distribution field devices	E
UETTDRSB38A	Commission power system distribution field devices	UETTDRSB18B	Commission distribution field devices	E
UETTDRSB39A	Perform power system substation switching operation to a given schedule	UETTDRIS45A	Perform power system substation switching operation to a given schedule	E

2.1.9 System Operations Competency Standard Units

UET12 Unit Code	UET12 Unit Title	UET09 Unit Code – V3	UET09 Unit Title – V3	E = Equivalent N = Not Equivalent
UETTDRSO32A	Manage power systems network faults	UETTDRSO02B	Manage network faults	E
UETTDRSO33A	Manage power systems critical events	UETTDRSO03B	Manage critical events	E
UETTDRSO34A	Control power systems generating plant	UETTDRSO04B	Control generating plant	E
UETTDRSO35A	Manage high voltage distribution and subtransmission network demand	UETTDRSO05B	Manage HV distribution and subtransmission network demand	E
UETTDRSO36A	Develop low voltage distribution switching programs	UETTDRSO06B	Develop LV distribution switching programs	E
UETTDRSO37A	Develop high voltage	UETTDRSO07B	Develop HV	E

	distribution and subtransmission switching programs		distribution and subtransmission switching programs	
UETTDRSO38A	Develop and evaluate power systems transmission switching programs	UETTDRSO08B	Develop and evaluate transmission switching programs	E
UETTDRSO39A	Coordinate low voltage distribution networks	UETTDRSO09B	Coordinate LV distribution networks	E
UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks	UETTDRSO10B	Coordinate HV distribution and subtransmission networks	E
UETTDRSO41A	Manage power systems transmission networks	UETTDRSO11B	Manage transmission networks	E
UETTDRSO42A	Manage power systems transmission network demand	UETTDRSO12B	Manage transmission network demand	E
UETTDRSO43A	Coordinate low voltage distribution network demand	UETTDRSO13B	Coordinate LV distribution network demand	E
UETTDRSO44A	Develop crisis power systems management plans	UETTDRSO14B	Develop crisis management plans	E
UETTDRSO45A	Operate and monitor system SCADA equipment	UETTDRSO15A	Operate and monitor system equipment (SCADA)	E
UETTDRSO46A	Monitor and control the field staff activities	UETTDRSO16A	Monitor and control the activities of field staff	E
UETTDRSO47A	Coordinate high voltage transmission network	UETTDRSO17A	Coordinate HV transmission network	E
UETTDRSO48A	Respond to discrete and interdependent protection operations	UETTDRSO18A	Respond to discrete/interdependent protection operations	E
UETTDRSO49A	Coordinate power system operations in a regulated energy	UETTDRSO19A	Coordinate system operations in a regulated energy	E

	market		market	
UETTDRSO50A	Respond to complex power system protection operations	UETTDRSO20A	Respond to complex protection operations	E
UETTDRSO51A	Manage network systems power flows	UETTDRSO21A	Manage network power flows	E

2.1.10 Transmission Competency Standard Units

UET12 Unit Code	UET12 Unit Title	UET09 Unit Code – V3	UET09 Unit Title – V3	E = Equivalent N = Not Equivalent
UETTD RTP22A	Establish and reinstate a power systems transmission structure work site	UETTD RTP02B	Establish and reinstate a transmission tower work site	E
UETTD RTP23A	Erect power systems transmission structures	UETTD RTP03B	Erect transmission towers	E
UETTD RTP24A	Erect power systems transmission structure hardware	UETTD RTP04B	Erect transmission tower hardware	E
UETTD RTP25A	Pre-tension stringing overhead transmission conductors and cables	UETTD RTP05B	Pre-tension stringing transmission overhead conductors and cables	E
UETTD RTP26A	Install transmission structures and associated hardware	UETTD RTP06B	Erect transmission towers and associated hardware	E
UETTD RTP27A	Maintain transmission structures and associated hardware	UETTD RTP07B	Maintain transmission towers and associated hardware	E
UETTD RTP28A	Set-up and install transmission structure stubs	UETTD RTP08B	Transmission tower stub setting	E
UETTD RTP29A	Install and maintain transmission overhead conductors and cables	UETTD RTP09B	Install and maintain overhead conductors and cables (towers)	E

UETTD RTP30A	Inspect transmission overhead structures and electrical apparatus	UETTD RTP10B	Inspect overhead structures and electrical apparatus (towers)	E
UETTD RTP31A	Maintain energised transmission lines using high voltage live work stick method	UETTD RTP11B	Maintain energised lines (transmission) using live line stick technique	E
UETTD RTP32A	Maintain energised transmission lines using high voltage live work Barehand method	UETTD RTP12B	Maintain energised lines (transmission) using Barehand Technique	E
UETTD RTP33A	Maintain energised transmission lines using Barehand Technique on a helicopter platform	UETTD RTP13B	Maintain energised lines (transmission) using Barehand Technique on a helicopter platform	E
UETTD RTP34A	Install/maintain overhead transmission network infrastructure	UETTD RTP14B	Install and maintain overhead transmission network infrastructure	E
UETTD RTP35A	Install/maintain transmission network infrastructure electrical equipment	UETTD RTP15B	Install and maintain transmission network infrastructure electrical equipment	E
UETTD RTP99A	Test and verify transmission overhead installations	New Unit	New Unit	

2.1.11 Testing Competency Standard Units

UET12 Unit Code	UET12 Unit Title	UET09 Unit Code – V3	UET09 Unit Title – V3	E = Equivalent N = Not Equivalent
UETTD RTS21A	Maintain interdependent network protection and control systems	UETTD RTS01B	Maintain network protection and control systems (interdependent)	E

UETTDRTS22A	Commission interdependent network protection and control systems	UETTDRTS02B	Commission network protection and control systems (interdependent)	E
UETTDRTS23A	Conduct evaluation of power system substation faults	UETTDRTS03B	Conduct evaluation of power system faults within a substation	E
UETTDRTS24A	Design testing and commissioning procedures for field devices and substations	UETTDRTS04B	Design testing and commissioning procedures for substation and field devices	E
UETTDRTS25A	Maintain and test and metering schemes	UETTDRTS05B	Test and maintain metering schemes	E
UETTDRTS26A	Commission power systems metering schemes	UETTDRTS06B	Commission metering schemes	E
UETTDRTS27A	Perform accuracy checks on power systems instrument transformers	UETTDRTS07B	Perform accuracy checks on instrument transformers	E
UETTDRTS28A	Repair, test and calibrate protection relays and meters	UETTDRTS08B	Test, repair and calibrate protection relays and meters	E
UETTDRTS29A	Develop power systems secondary isolation instructional documents	UETTDRTS09B	Develop secondary isolation instructional documents	E
UETTDRTS30A	Design power systems secondary isolation instructional documents	UETTDRTS10B	Design secondary isolation instructional documents	E
UETTDRTS31A	Maintain, test and commission power systems voltage regulating equipment	UETTDRTS11B	Maintain, test and commission voltage regulating equipment	E
UETTDRTS32A	Conduct evaluation of power systems primary plant	UETTDRTS12B	Conduct evaluation of primary plant	E
UETTDRTS33A	Undertake power systems project management of	UETTDRTS13B	Undertake project management of substation	E

	substation augmentation and maintenance		augmentation and maintenance	
UETTDRTS34A	Install and maintain power system communication equipment	UETTDRTS14B	Install and maintain power system communication equipment	E
UETTDRTS35A	Maintain complex network protection and control systems	UETTDRTS15B	Maintain network protection and control systems (Complex)	E
UETTDRTS36A	Commission complex network protection and control systems	UETTDRTS16B	Commission network protection and control systems (complex)	E
UETTDRTS37A	Perform current injection testing using phantom load	New Unit	New Unit	
UETTDRTS38A	Install and replace high voltage metering and associated equipment	New Unit	New Unit	
UETTDRTS39A	Maintain compliance with national electricity market metrology practices and procedures	New Unit	New Unit	
UETTDRTS40A	Test and maintain energy/revenue metering schemes	New Unit	New Unit	
UETTDRTS41A	Install and replace complex energy/revenue metering schemes and associated equipment	New Unit	New Unit	
UETTDRTS42A	Management of energy registration data errors for revenue billing purposes	New Unit	New Unit	
UETTDRTS43A	Commission energy/revenue metering schemes	New Unit	New Unit	

UETTDRTS44A	Test and maintain energy/revenue metering schemes (complex)	New Unit	New Unit	
UETTDRTS45A	Manage compliance with national electricity market metrology practices and procedures	New Unit	New Unit	
UETTDRTS46A	Verification and certification of revenue metering/energy measurement instruments	New Unit	New Unit	
UETTDRTS47A	Commission energy/revenue metering schemes (complex)	New Unit	New Unit	

2.1.12 Vegetation Competency Standard Units

UET12 Unit Code	UET12 Unit Title	UET09 Unit Code – V3	UET09 Unit Title – V3	E = Equivalent N = Not Equivalent
UETTDRVC21A	Use climbing techniques to cut vegetation above ground near live electrical apparatus	UETTDRVC01B	Cut vegetation above ground outside live work zone near live electrical apparatus (climbing)	E
	Removed	UETTDRVC02B	Operate vegetation control plant, machinery and equipment near live electrical apparatus	

UETTDRVC23A	Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus	UETTDRVC03B	Plan for the removal of vegetation up to vegetation exclusion zone near live electrical apparatus	E
UETTDRVC24A	Assess vegetation and recommend control measures in an ESI environment	UETTDRVC04B	Assess vegetation and recommend control measures for work near live electrical apparatus	E
UETTDRVC25A	Use elevated platform to cut vegetation above ground level near live electrical apparatus	UETTDRVC05B	Cut vegetation above ground outside live work zone near live electrical apparatus (platform)	E
UETTDRVC26A	Cut vegetation at ground level near live electrical apparatus	UETTDRVC06B	Cut vegetation at ground level outside 'vegetation exclusion zone' near live electrical apparatus	E
UETTDRVC27A	Monitor safety compliance of vegetation control work in an ESI environment	UETTDRVC07B	Monitor safety compliance for vegetation work near live electrical apparatus	E
	Removed	UETTDRVC08B	Safe use of Elevating Work Platform (EWP) near live electrical apparatus	

UETTDRVC29A	Control vegetation whilst performing linework	UETTDRVC09B	Control vegetation (linework)	E
UETTDRVC30A	Coordinate vegetation control operations	UETTDRVC10B	Coordinate vegetation control work	E
UETTDRVC31A	Operate specialist equipment at ground level near live electrical apparatus	New Unit	New Unit	
UETTDRVC32A	Use specialised plant to cut vegetation above ground level near live electrical apparatus	New Unit	New Unit	
UETTDRVC33A	Apply pruning techniques to vegetation control near live electrical apparatus	New Unit	New Unit	
UETTDRVC34A	Undertake release and rescue from a tree near live electrical apparatus	New Unit	New Unit	

Table 2 Relationship between UET09 Version 3 Units and UET09 Version 2.1 Units

Full prerequisite chains for unit prerequisites are listed where applicable in italicised text.

UET09 Version 3 CSU Code	Unit Title	UET09 Version 2.1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRI81A	Install telecommunications infrastructure on electricity supply	New Unit	New Unit	UETTDRELO4B; UEENEEE001B; UEENEEE002B;	2	80	New Unit

				UEENEEE00 5B			
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Table 3 Relationship between UET09 Version 2.1 Units and UET09 Version 2.0 Units

Full prerequisite chains for unit prerequisites are listed where applicable in italicised text.

UET09 Version 2.1 CSU Code	Unit Title	UET09 Version 2.0 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF.	Weighting Points	Equivalent - Full, part or not
		All existing Units in all disciplines	No change in existing units. Please refer to the mapping Tables 4 and 5 above.	No change in existing units. Please refer to the mapping Tables 4 and 5 above.			

Table 4 Relationship between UET09 Version 2 Units and UET09 Version 1 Units

Full prerequisite chains for unit prerequisites are listed where applicable in italicised text.

All Other Disciplines in the UET12 Training Package

UET09 Version 2 CSU Code	Unit Title	UET09 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF.	Weighting Points	Equivalent - Full, part or not
		All existing Units in all disciplines	No change in existing units. Please refer to the mapping for UET12 version 1 see Table 4 above.	No change in existing units. Please refer to the mapping for UET12 version 1 see table 4 above.	N/A		

Discipline - Refresher Training

UET09 Version 2 CSU Code	Unit Title	UET09 Version 1 Compete ncy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalence - Full, part or not
UETDRRF0 1A	Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus	New Unit	New Unit	Nil	N/A	No weighting points for this unit as it is only to be used for refresher training.	New Unit
UETDRRF0 2A	Perform pole top rescue	New Unit	New Unit	Nil	N/A	No weighting points for this unit as it is only to be used for refresher training.	New Unit
UETDRRF0 3A	Perform EWP rescue	New Unit	New Unit	HLTCPR20 1A	N/A	No weighting points for this unit as	New Unit

UET09 Version 2 CSU Code	Unit Title	UET09 Version 1 Compete ncy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighti ng Points	Equivale nt - Full, part or not
						it is only to be used for refreshe r training .	
UETDRRF0 4A	Perform tower rescue	New Unit	New Unit	Nil	N/A	No weighti ng points for this unit as it is only to be used for refreshe r training .	New Unit
UETDRRF0 5A	Perform rescue from switchyard structures at heights	New Unit	New Unit	Nil	N/A	No weighti ng points for this unit as it is only to be used for refreshe r training .	New Unit

UET09 Version 2 CSU Code	Unit Title	UET09 Version 1 Compete ncy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighti ng Points	Equivale nt - Full, part or not
UETDRRF06A	Perform rescue from a live LV panel	New Unit	New Unit	HLTCPR201A	N/A	No weighting points for this unit as it is only to be used for refresher training.	New Unit
UETDRRF07A	Perform cable pit/trench/excavation rescue	New Unit	New Unit	HLTCPR201A	N/A	No weighting points for this unit as it is only to be used for refresher training.	New Unit
UETDRRF08A	Perform EWP controlled descent escape	New Unit	New Unit	Nil	N/A	No weighting points for this unit as it is only to be used	New Unit

UET09 Version 2 CSU Code	Unit Title	UET09 Version 1 Compete ncy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighti ng Points	Equivale nt - Full, part or not
						for refreshe r training .	
UETDRRF09A	Apply access procedures to work on or near electrical network infrastructure	New Unit	New Unit	Nil	N/A	No weighti ng points for this unit as it is only to be used for refreshe r training .	New Unit
UETDRRF10A	Provide first aid in an ESI environment	New Unit	New Unit	Nil	N/A	No weighti ng points for this unit as it is only to be used for refreshe r training .	New Unit

Table 5 Relationship between UET09 Version 1 Units and UET06 Version 1 Units

Full prerequisite chains for unit prerequisites are listed where applicable in italicised text.

Discipline – Cable Jointing

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighting Points	Equivalent - Full, part or not
UETTDRCJ0 1B	Lay electrical cables	UETTDRCJ0 1A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDREL 01B & UETTDREL 02B & UETTDREL 04B & UEENEEE00 1B & UEENEEE00 2B & UEENEEE00 4B & UEENEEE00 5B & UEENEEE00 7B & UEENEEG00 1B & UEENEEG00 2B UEENEEE00 3B	3	30	Full
UETTDRCJ0 2B	Install and maintain de-energised LV underground paper insulated	UETTDRCJ0 2A	Revised Unit includes editorial changes, reformatted unit	UETTDRCJ0 1B UETTDREL 01B UETTDREL	3	100	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighting Points	Equivalent - Full, part or not
	cables		layout and updated pre-requisites	02B UETTDREL 04B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEO00 1B UEENEEO00 2B			
UETTDRCJ0 3B	Install and maintain de-energised HV underground paper insulated cables.	UETTDRCJ0 3A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRCJ0 1B UETTDREL 01B UETTDREL 02B UETTDREL 04B UEENEEE00 1B UEENEEE00 2B	3	100	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighting Points	Equivalent - Full, part or not
				UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG00 1B UEENEEG00 2B			
UETTDRCJ0 4B	Joint and maintain energised LV underground paper insulated cables	UETTDRCJ0 4A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRCJ0 2B UETTDRCJ0 1B UETTDREL 01B UETTDREL 02B UETTDREL 04B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00	3	100	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighting Points	Equivalent - Full, part or not
				4B UEENEEE00 5B UEENEEE00 7B UEENEEG00 1B UEENEEG00 2B			
UETTDRCJ0 5B	Perform straight through HV paper insulated to polymeric transition joint	UETTDRCJ0 5A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	UETTDRCJ0 7B UETTDRCJ0 1B UETTDRCJ0 6B UETTDREL 01B UETTDREL 02B UETTDREL 04B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00	3	90	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighting Points	Equivalent - Full, part or not
				5B UEENEEE00 7B UEENEEG00 1B UEENEEG00 2B			
UETTDRCJ0 6B	Install and maintain de-energised LV underground polymeric cables	UETTDRCJ0 6A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRCJ0 1B UETTDREL 01B UETTDREL 02B UETTDREL 04B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG00 1B	3	90	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighting Points	Equivalent - Full, part or not
UETTDRCJ0 7B	Install and maintain de-energised HV underground polymeric cables	UETTDRCJ0 7A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRCJ0 6B UETTDRCJ0 1B UETTDREL 01B UETTDREL 02B UETTDREL 04B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEO00 1B UEENEEO00 2B	3	90	Full
UETTDRCJ0 8B	Joint and maintain energised	UETTDRCJ0 8A	Revised Unit includes	UETTDRCJ0 6B	3	90	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighting Points	Equivalent - Full, part or not
	LV underground polymeric cables		editorial changes, reformatted unit layout and updated pre-requisites	UETTDRCJ0 1B UETTDREL 01B UETTDREL 02B UETTDREL 04B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG00 1B UEENEEG00 2B			
UETTDRCJ0 9B	Install oil and gas filled specialised underground cables	UETTDRCJ0 9A	Revised Unit includes editorial changes, reformatted unit layout and	UETTDRCJ0 3B & UETTDRCJ0 7B UETTDRCJ0	4	120	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighting Points	Equivalent - Full, part or not
			updated pre-requisi tes	1B UETTDRCJ0 6B UETTDREL 01B UETTDREL 02B UETTDREL 04B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEO00 1B UEENEEO00 2B			
UETTDRCJ1 0B	Maintain oil and gas filled specialised undergrou nd cables	UETTDRCJ1 0A	Revised Unit includes editorial changes, reformatte	UETTDRCJ0 9B UETTDRCJ0 1B	4	120	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighting Points	Equivalent - Full, part or not
			d unit layout and updated pre-requisi tes	UETTDRCJ0 3B UETTDRCJ0 6B UETTDRCJ0 7B UETTDREL 01B UETTDREL 02B UETTDREL 04B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG00 1B UEENEEG00 2B			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighting Points	Equivalent - Full, part or not
UETTDRCJ1 1B	Install and maintain polymeric specialised underground cables	UETTDRCJ1 1A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRCJ0 3B & UETTDRCJ0 7B UETTDRCJ0 1B UETTDRCJ0 6B UETTDREL 01B UETTDREL 02B UETTDREL 04B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG00 1B UEENEEG00 2B	4	130	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighti ng Points	Equivale nt - Full, part or not

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighting Points	Equivalent - Full, part or not
UETTDRCJ1 2B	Install and maintain oil & gas pressure systems for specialised underground cables	UETTDRCJ1 2A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRCJ0 3B & UETTDRCJ0 7B UETTDRCJ0 1B UETTDRCJ0 6B UETTDREL 01B UETTDREL 02B UETTDREL 04B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG00 1B UEENEEG00 2B	4	130	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighti ng Points	Equivale nt - Full, part or not

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighting Points	Equivalent - Full, part or not
UETTDRCJ1 3B	Install and maintain network infrastructure LV underground cables	UETTDRCJ1 3A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRI06B A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence. & UETTDREL 02B UETTDRI2 2B UETTDRI2 3B UEENEEE00 1B UETTDREL 01B UETTDREL 04B	4	120	Full
UETTDRCJ1 4B	Install and maintain network	UETTDRCJ1 4A	Revised Unit includes	UETTDRCJ1 3B	4	130	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F	Weighting Points	Equivalent - Full, part or not
	infrastructure HV underground cables		editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence. & UETTDRI0 6B UETTDREL 02B UETTDRI2 2B UETTDRI2 3B UEENEEE00 1B UETTDREL 01B UETTDREL 04B			

Discipline - Distribution

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRDP 01B	Inspect overhead structures and electrical apparatus (poles /structures)	UETTDRDP 01A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	UETTDRIS1 2B UETTDREL 01B UETTDREL 02B UETTDREL 04B UEUNEEE0 01B UEUNEEE0 02B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B	3	90	Full
UETTDRDP 02B	Maintain overhead energised LV conductor s and cables	UETTDRDP 02A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi	UETTDRIS1 4B UETTDREL 01B UETTDREL 02B UETTDREL 04B	3	100	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			tes	UETTDRIS1 2B UEUNEEEE0 01B UEUNEEEE0 02B UEENEEEE00 3B UEENEEEE00 4B UEENEEEE00 5B UEENEEEE00 7B UEENEEG0 01B			
UETTDRDP 03B	Maintain energised high voltage distribution overhead electrical apparatus (stick)	UETTDRDP 03A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	BSBWOR40 2A & UETTDRDP 02B & UETTDRIS0 2B & UETTDRIS2 5B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRIS0 1B UETTDRIS1	4	130	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationsh ip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighti ng Points	Equivale nt - Full, part or not
				2B UETTDRIS1 4B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B UEENEEG0 02B			
UETTDRDP 04B	Maintain energised high voltage distributio n overhead electrical apparatus (glove)	UETTDRDP 04A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	BSBWOR40 2A & UETTDRDP 02B & UETTDRIS0 2B & UETTDRIS2 5B UETTDREL 01B UETTDREL 02B UETTDREL 04B	4	130	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETTDRIS0 1B UETTDRIS1 2B UETTDRIS1 4B UEUNEEE0 01B UEUNEEE0 02B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B UEENEEG0 02B			
UETTDRDP 05B	Inspect, maintain and restore energised LV overhead distribution network infrastructure	UETTDRDP 05A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRIS0 6B UETTDRIS2 7B A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or	4	130	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence. & UETTDREL02B UETTDRLS22B UETTDRLS23B UEENEEE001B UETTDREL01B UETTDREL04B			

Discipline - Design

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRDS 01B	Draft and layout an overhead distribution extension	UETTDRDS 01A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRIS2 2B & UETTDRIS2 3B & UEENEEE0 02B & UEENEEE0 07B & UEENEEG0 02B UETTDREL 01B UETTDREL 04B UEENEEE0 01B	4	110	Full
UETTDRDS 02B	Draft and layout an underground distribution extension	UETTDRDS 02A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRIS2 2B & UETTDRIS2 3B & UEENEEE0 02B & UEENEEE0 07B & UEENEEG0 02B UETTDREL 01B UETTDREL 04B UEENEEE0 01B	4	110	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRDS 03B	Draft and layout a street lighting system	UETTDRDS 03A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRIS2 2B & UETTDRIS2 3B & UEENEEE0 02B & UEENEEE0 07B & UEENEEG0 02B UETTDREL 01B UETTDREL 04B UEENEEE0 01B	4	110	Full
UETTDRDS 04B	Draft and layout a distribution substation minor upgrade	UETTDRDS 04A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRIS2 2B & UETTDRIS2 3B & UEENEEE0 02B & UEENEEE0 07B & UEENEEG0 02B UETTDREL 01B UETTDREL 04B UEENEEE0 01B	4	120	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRDS 05B	Design overhead distribution systems	UETTDRDS 05A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRDS 13B & UETTDRDS 15B UETTDRDS 09B UETTDRDS 01B UETTDRDS 04B UETTDRDS 22B UETTDRDS 23B UEENEEE0 01B UEENEEE0 07B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B	5	140	Full
UETTDRDS 06B	Design underground distribution systems	UETTDRDS 06A	Revised Unit includes editorial changes, reformatted unit	UETTDRDS 13B & UETTDRDS 15B UETTDRDS 09B	5	140	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			layout and updated pre-requisites	UETTDREL 01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2 3B UEENEEE0 01B UEENEEE0 07B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRDS 07B	Design distribution substations	UETTDRDS 07A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRDS 13B & UETTDRDS 15B UETTDRDS 09B UETTDREL 01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2	5	140	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				3B UEENEEE0 01B UEENEEE0 07B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRDS 08B	Design public lighting systems	UETTDRDS 08A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRDS 13B & UETTDRDS 15B UETTDRDS 09B UETTDREL 01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2 3B UEENEEE0 01B UEENEEE0 07B UEENEEG0 02B	5	140	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEG047B UEENEEG048B UEENEEG049B			
UETTDRDS09B	Prepare and manage detailed construction plans for electrical system infrastructure	UETTDRDS09A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UEENEEG002B & UETTDRIS23B UETTDREL01B	5	140	Full
UETTDRDS10B	Prepare and appraise financial impact statements	UETTDRDS10A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRDS09B OR UETTDRTS16B UETTDREL01B UETTDREL04B UETTDRIS22B UETTDRIS23B UETTDRTS01B UETTDRTS02B UETTDRTS	6	200	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				09B UETTDRTS 15B UEENEEEE0 01B UEENEEEE0 07B UEENEEEE0 24B UEENEEED0 04B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTD RDS 11B	Manage electrical infrastructure projects	UETTD RDS 11A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTD RDS 10B UETTDREL 01B UETTDREL 04B UETTD RDS 09B UETTD RIS2 2B UETTD RIS2 3B UETTD RDS 01B	6	200	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETTDRTS 02B UETTDRTS 09B UETTDRTS 15B UETTDRTS 16B UEENEEE0 01B UEENEE0 04B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTD RDS 12B	Investigate quality of supply issues	UETTD RDS 12A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTD RDS 05B & UETTD RDS 06B UETTD RDS 09B UETTD RDS 13B UETTD RDS	5	140	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				15B UETTDREL 01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2 3B UEENEEE0 01B UEENEEE0 07B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRDS 13B	Develop HV and LV distribution protection systems	UETTDRDS 13A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UEENEEG0 49B & UEENEEE0 07B & UETTDRIS2 2B & UETTDRIS2 3B UETTDREL 01B UETTDREL 04B	5	150	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEG002B UEENEEG047B UEENEEG048B UEENEEE001B			
UETTDRDS14B	Design zone substations modifications	UETTDRDS14A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UEENEEE002B & UEENEEE007B & UETTDRIS22B & UETTDRIS23B UETTDREL01B UETTDREL04B UEENEEE001B	5	160	Full
UETTDRDS15B	Organise and implement line and easement surveys	UETTDRDS15A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRDS09B UEENEEG002B UETTDRIS23B UETTDREL01B	5	140	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTD RDS 16B	Develop planned outage strategies	UETTD RDS 16A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UEENEED0 04B OR UETTD R IS2 2B UETTDREL 04B UEENEEEE0 01B	5	140	Full
UETTD RDS 17B	Review asset management strategies	UETTD RDS 17A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTD R DS 09B OR UETTD R TS 16B UETTDREL 01B UETTDREL 04B UETTD R IS2 2B UETTD R IS2 3B UEENEED0 04B UEENEEEE0 01B UEENEEG0 02B	6	180	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRDS 18B	Analyse and appraise fault and outage data	UETTDRDS 18A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRDS 09B UEENEEG0 02B UETTDRIS2 3B UETTDREL 01B	6	180	Full
UETTDRDS 19B	Establish and manage geographical information systems data	UETTDRDS 19A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UEENEED0 04B & UEENEEE0 07B & UETTDRIS2 2B UETTDREL 04B UEENEEE0 01B	5	140	Full
UETTDRDS 20B	Design customer substations	UETTDRDS 20A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRDS 07B UETTDRDS 09B UETTDREL 01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2	5	150	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				3B UEENEEE0 01B UEENEEE0 07B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRDS 21B	Manage transmission and sub-transmission design process	UETTDRDS 21A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRDS 09B UEENEEG0 02B UETTDRIS2 3B UETTDREL 01B	6	180	Full
UETTDRDS 22B	Design transmission, sub-transmission and zone substation buildings	UETTDRDS 22A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requis	UETTDRDS 09B & UETTDRDS 14B UETTDREL 01B UETTDREL 04B UETTDRIS2	6	200	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			ites	2B UETTDRIS2 3B UEENEEG0 02B UEENEEEE0 01B UEENEEEE0 02B UEENEEEE0 07B			
UETTDRDS 23B	Design transmission and sub-transmission substation primary plant	UETTDRDS 23A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRDS 09B & UETTDRDS 14B UETTDREL 01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2 3B UEENEEG0 02B UEENEEEE0 01B UEENEEEE0 02B UEENEEEE0 07B	6	220	Full
UETTDRDS 24B	Design transmission	UETTDRDS 24A	Revised Unit	UETTDRDS 09B &	6	220	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
	and sub-transmission protection and control		includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRDS 14B UETTDREL 01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2 3B UEENEEG0 02B UEENEEE0 01B UEENEEE0 02B UEENEEE0 07B			
UETTDRDS 25B	Design transmission and sub-transmission substation earthing	UETTDRDS 25A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRDS 09B & UETTDRDS 14B UETTDREL 01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2 3B UEENEEG0 02B	6	200	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEE0 01B UEENEEE0 02B UEENEEE0 07B			
UETTDRDS 26B	Design transmission, sub-transmission and zone substation – civil and structural components	UETTDRDS 26A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRDS 09B & UETTDRDS 14B UETTDREL 01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2 3B UEENEEG0 02B UEENEEE0 01B UEENEEE0 02B UEENEEE0 07B	6	200	Full
UETTDRDS 27B	Design overhead transmission systems	UETTDRDS 27A	Revised Unit includes editorial changes, reformatted unit	UETTDRDS 15B UETTDRDS 09B UEENEEG0 02B	6	200	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			layout and updated pre-requisites	UETTDRIS23B UETTDREL01B			
UETTDRDS28B	Design underground transmission systems	UETTDRDS28A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRDS15B UETTDRDS09B UEENEEG002B UETTDRIS23B UETTDREL01B	6	200	Full

Discipline – Entry Level Cross Discipline

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDREL 01B	Apply environmental and sustainable energy procedures	UETTDREL 01A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	Nil	3	Core	Full
UETTDREL 02B	Operate plant and equipment near live electrical conductors/apparatus	UETTDREL 02A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	Nil	3	Core	Full
UETTDREL 03B	Comply with environmental and incidental response procedures	UETTDREL 03A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	Nil	2	Core TLA and Possible Skill Sets Unit	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDREL 04B	Working safely near live electrical apparatus as non electrical worker	UETTDREL 04A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	Nil	2	Core TLA and Possible Skill Sets Unit	Full
UETTDREL 05B	Respond to technical enquiries and requests	UETTDREL 05A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	Nil	3	Possible Skill Sets Unit 90	Full

Discipline – Industry Specific

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
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UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDNIS 01B	Install electrical equipment (network infrastructure)	UETTDNIS 01A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDREL 01B & UETTDREL 02B & UETTDREL 04B & UEENEEE00 1B & UEENEEE00 2B & UEENEEE00 4B & UEENEEE00 5B & UEENEEE00 7B & UEENEEG0 01B & UEENEEG0 02B UEENEEE00 3B	3	100	Full
UETTDNIS 02B	Maintain electrical equipment (network infrastructure)	UETTDNIS 02A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDNIS0 1B UETTDREL 01B UETTDREL 02B UETTDREL 04B UEENEEE00 1B UEENEEE00	3	100	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B UEENEEG0 02B			
UETTDRI 03B	Perform LV field switching operation to a given schedule	UETTDRI 03A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	UETTDRCJ0 3B or UETTDRCJ0 7B or UETTDRI0 2B or UETTDRI1 4B or UETTDRT 09B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRCJ0 1B UETTDRCJ0 6B	3	80	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETTDRIS01B UETTDRIS12B UETTDRTP06B UETTDRTP07B UEENEEE001B UEENEEE002B UEENEEE003B UEENEEE004B UEENEEE005B UEENEEE007B UEENEEG001B UEENEEG002B			
UETTDRIS04B	Perform high voltage field switching operation to a given schedule	UETTDRIS04A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRJCJ03B or UETTDRJCJ07B or UETTDRIS02B or UETTDRIS14B or UETTDRTP09B	3	80	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRCJ0 1B UETTDRCJ0 6B UETTDRI0 1B UETTDRI1 2B UETTDRT0 6B UETTDRT0 7B UEENEEE0 1B UEENEEE0 2B UEENEEE0 3B UEENEEE0 4B UEENEEE0 5B UEENEEE0 7B UEENEEG0 01B UEENEEG0 02B			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRIS 05B	Perform substation switching operation to a given schedule	UETTDRIS 05A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	UETTDRCJ0 3B or UETTDRCJ0 7B or UETTDRIS0 2B or UETTDRIS1 4B or UETTD RTP 09B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRCJ0 1B UETTDRCJ0 6B UETTDRIS0 1B UETTDRIS1 2B UETTD RTP 06B UETTD RTP 07B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B	3	80	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEE005B UEENEEE007B UEENEEG001B UEENEEG002B			
UETTDRIS 06B	Install and maintain network infrastructure electrical equipment	UETTDRIS 06A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDREL02B & UETTDRIS22B & UETTDRIS23B & A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence. UEENEEE001B UETTDREL	4	110	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				01B UETTDREL 04B			
UETTDNIS 07B	Sample, test, filter and reinstate insulating oil	UETTDNIS 07A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.	3	80	Full
UETTDNIS 08B	Develop HV switching schedule	UETTDNIS 08A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	UETTDNIS0 3B or UETTDNIS0 4B or UETTDNIS0 5B or UETTDNRT 10B UETTDRCJ0 1B	4	110	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETTDRCJ0 3B UETTDRCJ0 6B UETTDRCJ0 7B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDNIS0 1B UETTDNIS0 2B UETTDNIS1 2B UETTDNIS1 4B UETTDRT0 06B UETTDRT0 07B UETTDRT0 09B UETTDRT1 01B UETTDRT1 02B UETTDRT1 08B UEENEEE00 1B UEENEEE00			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B UEENEEG0 02B			
UETTDRIS 09B	Develop LV switching schedule	UETTDRIS 09A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	UETTDRIS0 3B or UETTDRIS0 4B or UETTDRIS0 5B or UETTDRRT 10B UETTDRJCJ0 1B UETTDRJCJ0 3B UETTDRJCJ0 6B UETTDRJCJ0 7B UETTDRREL 01B UETTDRREL 02B UETTDRREL	4	110	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				04B UETTDRIS0 1B UETTDRIS0 2B UETTDRIS1 2B UETTDRIS1 4B UETTD RTP 06B UETTD RTP 07B UETTD RTP 09B UETTD RRT 01B UETTD RRT 02B UETTD RRT 08B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEG0 02B			
UETTDRIS 10B	Coordinate permit procedures	UETTDRIS 10A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRIS0 3B or UETTDRIS0 4B or UETTDRIS0 5B or UETTDRRT 10B UETTDRJCJ0 1B UETTDRJCJ0 3B UETTDRJCJ0 6B UETTDRJCJ0 7B UETTDRREL 01B UETTDRREL 02B UETTDRREL 04B UETTDRIS0 1B UETTDRIS0 2B UETTDRIS1 2B UETTDRIS1 4B UETTDRTP	4	120	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				06B UETTDRTTP 07B UETTDRTTP 09B UETTDRTTP 01B UETTDRTTP 02B UETTDRTTP 08B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B UEENEEG0 02B			
UETTDRTS 11B	Coordinate and direct switching schedules	UETTDRTS 11A	Revised Unit includes editorial changes, reformatte d unit	UETTDRTS0 3B or UETTDRTS0 4B or UETTDRTS0 5B or UETTDRTTP	4	110	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			layout and updated pre-requisites	10B UETTDRCJ01B UETTDRCJ03B UETTDRCJ06B UETTDRCJ07B UETTDREL01B UETTDREL02B UETTDREL04B UETTDNIS01B UETTDNIS02B UETTDNIS12B UETTDNIS14B UETTDRT06B UETTDRT07B UETTDRT09B UETTDRT01B UETTDRT02B UETTDRT			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				08B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B UEENEEG0 02B			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRIS 12B	Install and maintain poles/structures and associated hardware	UETTDRIS 12A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDREL 01B & UETTDREL 02B & UETTDREL 04B & UEENEEE00 1B & UEENEEE00 2B & UEENEEE00 4B & UEENEEE00 5B & UEENEEE00 7B & UEENEEO0 01B UEENEEE00 3B	3	90	Full
UETTDRIS 13B	Install and maintain public lighting systems	UETTDRIS 13A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRCJ0 3B or UETTDRCJ0 7B or UETTDRIS0 2B or UETTDRIS1 4B or UETTD RTP 09B	3	80	Full
UETTDRIS 14B	Install and maintain overhead conductors and cables	UETTDRIS 14A	Revised Unit includes editorial changes,	UETTDRIS1 2B UETTDREL 01B	3	100	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
	(poles and structures)		reformatted unit layout and updated pre-requisites	UETTDREL02B UETTDREL04B UEUNEEE001B UEUNEEE002B UEENEEE003B UEENEEE004B UEENEEE005B UEENEEE007B UEENEEG001B			
UETTDRI15B	Install and maintain low voltage services (underground)	UETTDRI15A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRCJ03B or UETTDRCJ07B or UETTDRI02B or UETTDRI14B or UETTDRT09B UETTDREL01B UETTDREL02B UETTDREL	3	80	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				04B UETTDRCJ0 1B UETTDRCJ0 6B UETTDRIS0 1B UETTDRIS1 2B UETTD RTP 06B UETTD RTP 07B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B UEENEEG0 02B			
UETTDRIS 16B	Install and maintain low voltage services (overhead)	UETTDRIS 16A	Revised Unit includes editorial changes, reformatte	UETTDRCJ0 3B or UETTDRCJ0 7B or UETTDRIS0 2B or	3	80	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			d unit layout and updated pre-requisi tes	UETTDRI1 4B or UETTDRT 09B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRCJ 01B UETTDRCJ 06B UETTDRI 01B UETTDRI 02B UETTDRT 06B UETTDRT 07B UEENEEE 001B UEENEEE 002B UEENEEE 003B UEENEEE 004B UEENEEE 005B UEENEEE 007B			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEG0 01B UEENEEG0 02B			
UETTDRIS 17B	Conduct visual checking and treatment of poles and structures	UETTDRIS 17A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	UETTDRIS1 2B UETTDREL 01B UETTDREL 02B UETTDREL 04B UEUNEEEE0 01B UEUNEEEE0 02B UEENEEEE00 3B UEENEEEE00 4B UEENEEEE00 5B UEENEEEE00 7B UEENEEG0 01B	2	40	Full
UETTDRIS 18B	Locate faults in underground power cables	UETTDRIS 18A	Revised Unit includes editorial changes, reformatte	UETTDRJCJ0 3B or UETTDRJCJ0 7B or UETTDRIS0 2B or	4	110	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			d unit layout and updated pre-requisi tes	UETTDRIS1 4B or UETTDRTP 09B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRCJ0 1B UETTDRCJ0 6B UETTDRIS0 1B UETTDRIS1 2B UETTDRTP 06B UETTDRTP 07B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEG0 01B UEENEEG0 02B			
UETTDRIS 19B	Conduct high potential testing of underground power cables	UETTDRIS 19A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRCJ0 3B or UETTDRCJ0 7B or UETTDRIS0 2B or UETTDRIS1 4B or UETTD RTP 09B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRCJ0 1B UETTDRCJ0 6B UETTDRIS0 1B UETTDRIS1 2B UETTD RTP 06B UETTD RTP 07B UEENEEE00	3	90	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEO0 01B UEENEEO0 02B			
UETTDRIS 20B	Install and replace energy meters and associated equipment	UETTDRIS 20A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRJCJ0 3B or UETTDRJCJ0 7B or UETTDRIS0 2B or UETTDRIS1 4B or UETTDRTP 09B UETTDRREL 01B UETTDRREL 02B UETTDRREL 04B UETTDRJCJ0 1B	3	90	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETTDRCJ0 6B UETTDRI0 1B UETTDRI1 2B UETTDRT0 6B UETTDRT0 7B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B UEENEEG0 02B			
UETTDRI0 21B	Install mobile Generation set for synchronise d Genset LV	UETTDRI0 21A	Revised Unit includes editorial changes, reformatte d unit layout and updated	UETTDRCJ0 3B or UETTDRCJ0 7B or UETTDRI0 2B or UETTDRI1 4B or UETTDRT0	3	90	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			pre-requisites	09B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRCJ0 1B UETTDRCJ0 6B UETTDRI0 1B UETTDRI1 2B UETTDRT0 6B UETTDRT0 7B UEENEEE0 1B UEENEEE0 2B UEENEEE0 3B UEENEEE0 4B UEENEEE0 5B UEENEEE0 7B UEENEEG0 01B UEENEEG0			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				02B			
UETTDRIS 22B	Implement and monitor the organisational OHS policies, procedures and programs	UETTDRIS 22A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UEENEEE001B & UETTDRIS04B	4	Core	Full
UETTDRIS 23B	Implement and monitor environmental and sustainable energy management policies and procedures	UETTDRIS 23A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRIS01B	4	Core	Full
UETTDRIS 24B	Install mobile Generation set for synchronised genset HV	UETTDRIS 24A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRIS03B or UETTDRIS04B or UETTDRIS05B or UETTDRIS10B & UETTDRIS21B	3	90	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETTDRCJ0 1B UETTDRCJ0 3B UETTDRCJ0 6B UETTDRCJ0 7B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRI0 1B UETTDRI0 2B UETTDRI1 2B UETTDRI1 4B UETTDRT 01B UETTDRT 02B UETTDRT 07B UETTDRT 08B UETTDRT 06B UETTDRT 07B			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETTD RTP 09B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B UEENEEG0 02B			
UETTD RIS 25B	Contribute to coordinated high voltage live line work	UETTD RIS 25A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	Nil	3	100	Full
UETTD RIS 26B	Manage an electricity supply industry OHS	UETTD RIS 26A	Revised Unit includes editorial changes,	Nil	5	Core	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
	management system		reformatted unit layout and updated pre-requisites				
UETTDNIS 27B	Install and maintain overhead distribution network infrastructure	UETTDNIS 27A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDREL 02B & UETTDNIS2 2B & UETTDNIS2 3B & A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence. UETTDREL 01B UETTDREL 04B UEENEEE00	4	120	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				1B			
UETTDRIS 28A	Analyse and develop solutions for problems in extra-low voltage, single path circuits	New Unit – Version 2	New Unit	Nil	6	Core	
UETTDRIS 29A	Analyse and develop solutions for problems in multiple path d.c. circuits	New Unit – Version 2	New Unit	UETTDRIS2 8A	6	Core	
UETTDRIS 30A	Analyse and develop solutions for problems in electromagnetic circuits	New Unit – Version 2	New Unit	Nil	6	Core	
UETTDRIS 31A	Analyse and develop solutions for problems in single and three phase	New Unit – Version 2	New Unit	Nil	6	Core	

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
	low voltage circuits						

Discipline – Rail Traction

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETDRRT01B	Install overhead traction wiring systems	UETDRRT01A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETDRIS14B UETDREL01B UETDREL02B UETDREL04B UETDRIS12B UEUNEE001B UEUNEE002B UEENEE003B UEENEE004B	3	90	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEE005B UEENEEE007B UEENEEG001B			
UETDDRRT02B	Maintain overhead traction wiring systems	UETDDRRT02A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETDDRRT01B UETTDREL01B UETTDREL02B UETTDREL04B UETTDRI12B UETTDRI14B UEUNEEE001B UEUNEEE002B UEENEEE003B UEENEEE004B UEENEEE005B UEENEEE007B UEENEEG001B	3	100	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETDRRT 03B	Install traction bonds	UETDRRT 03A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	UETDRIS1 4B UETDREL 01B UETDREL 02B UETDREL 04B UETDRIS1 2B UEUNEEE0 01B UEUNEEE0 02B UENEEEE00 3B UENEEEE00 4B UENEEEE00 5B UENEEEE00 7B UENEEG0 01B	3	80	Full
UETDRRT 04B	Maintain traction bonds	UETDRRT 04A	Revised Unit includes editorial changes, reformatte d unit layout and updated	UETDRRT 03B UETDREL 01B UETDREL 02B UETDREL	3	90	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			pre-requisites	04B UETTDRIS1 2B UETTDRIS1 4B UEUNEEE0 01B UEUNEEE0 02B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B			
UETTDRRT 05B	Install overhead traction configurations	UETTDRRT 05A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRRT 02B & UETTDRRT 08B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRIS1 2B UETTDRIS1 4B	3	90	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETDDRRT 01B UETDDRRT 07B UEUNEEE0 01B UEUNEEE0 02B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B			
UETDDRRT 06B	Maintain overhead traction configurations	UETDDRRT 06A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETDDRRT 05B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRIS1 2B UETTDRIS1 4B UETDDRRT 01B UETDDRRT	3	100	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				02B UETDDRRT 07B UETDDRRT 08B UEUNEEE0 01B UEUNEEE0 02B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B			
UETDDRRT 07B	Install overhead traction equipment and components	UETDDRRT 07A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRI1 4B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRI1 2B UEUNEEE0 01B UEUNEEE0 02B	3	90	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B			
UETDRRT 08B	Maintain overhead traction equipment and components	UETDRRT 08A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETDRRT 07B UETDREL 01B UETDREL 02B UETDREL 04B UETDRIS1 2B UETDRIS1 4B UEUNEEE0 01B UEUNEEE0 02B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00	3	100	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				7B UEENEEG0 01B			
UETDDRRT 09B	Operate road rail traction height access equipment	UETDDRRT 09A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	UETDDRRT 02B & UETDDRRT 08B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRI1 2B UETTDRI1 4B UETDDRRT 01B UETDDRRT 07B UEUNEEE0 01B UEUNEEE0 02B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B	2	40	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEG0 01B			
UETDDRRT 10B	Perform rail traction switching operations to a given schedule	UETDDRRT 10A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	UETDDRRT 02B & UETDDRRT 08B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRI1 2B UETTDRI1 4B UETDDRRT 01B UETDDRRT 07B UEUNEEE0 01B UEUNEEE0 02B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B	3	80	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETDRRT 11B	Maintain energised direct current traction overhead wiring system	UETDRRT 11A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	BSBWOR40 2A & UETDRIS2 5B & UETDRRT 06B & UETDRRT 09B UETDREL 01B UETDREL 02B UETDREL 04B UETDRIS1 2B UETDRIS1 4B UETDRRT 01B UETDRRT 02B UETDRRT 05B UETDRRT 07B UETDRRT 08B UEUNEEE0 01B UEUNEEE0 02B UEENEEE00 3B	4	120	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B			
UETDRRT 12B	Maintain energised traction overhead electrical apparatus (stick)	UETDRRT 12A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	UETDRRT 11B UETDREL 01B UETDREL 02B UETDREL 04B UETDRIS1 2B UETDRIS1 4B UETDRIS2 5B UETDRRT 01B UETDRRT 02B UETDRRT 05B UETDRRT 06B UETDRRT 07B UETDRRT 08B	4	130	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETDDRRT 09B UEUNEEE0 01B UEUNEEE0 02B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B BSBWOR40 2A			
UETDDRRT 13B	Maintain energised traction overhead electrical apparatus (glove)	UETDDRRT 13A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	UETDDRRT 11B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRIS1 2B UETTDRIS1 4B UETTDRIS2 5B UETDDRRT	4	130	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				01B UETDDRRT 02B UETDDRRT 05B UETDDRRT 06B UETDDRRT 07B UETDDRRT 08B UETDDRRT 09B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B BSBWOR40 2A			
UETDDRRT 14B	Install and maintain traction network wiring	UETDDRRT 14A	Revised Unit includes editorial changes,	UETDRIS2 7B & A current 'Unrestricted	4	110	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
	systems		reformatted unit layout and updated pre-requisites	Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence. UETTDREL 02B UETTDRI2 2B UETTDRI2 3B UEENEEE00 1B UETTDREL 01B UETTDREL 04B			
UETTDRT 15B	Install and maintain traction network equipment and components	UETTDRT 15A	Revised Unit includes editorial changes, reformatted unit layout and updated	UETTDRT 14B & A current 'Unrestricted Electrician's Licence' or equivalent	4	130	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			pre-requisites	<p>issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.</p> <p>UETDDRRT11B UETTDREL01B UETTDREL02B UETTDREL04B UETTDRI12B UETTDRI14B UETTDRI25B UETDDRRT01B UETDDRRT02B UETDDRRT05B UETDDRRT06B UETDDRRT</p>			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				07B UETTDRRT 08B UETTDRRT 09B UEENEEE00 1B UEENEEE00 2B UEENEEE00 3B UEENEEE00 4B UEENEEE00 5B UEENEEE00 7B UEENEEG0 01B BSBWOR40 2A			

Discipline – Substation

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRSB01B	Diagnose and rectify faults in power system substation environment	UETTDRSB01A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.	4	Core	Full
UETTDRSB02B	Carry out substation inspection	UETTDRSB02A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.	4	Core	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRSB03B	Install and maintain substation DC system	UETTDRSB03A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.	4	Core	Full
UETTDRSB04B	Maintain HV power system breakers	UETTDRSB04A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.	4	Core	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRSB05B	Maintain HV power system – transformers and instrument transformers	UETTDRSB05A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.	4	Core	Full
UETTDRSB06B	Install high current DC switchgear and equipment	UETTDRSB06A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.	4	110	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRSB07B	Maintain high current DC switchgear and equipment	UETTDRSB07A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.	4	110	Full
UETTDRSB08A	RESERVE D						
UETTDRSB09B	Maintain voltage regulating equipment – capacitor banks	UETTDRSB09A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's	4	110	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				licence.			
UETTDRSB10B	Maintain HV power system static VAR compensators	UETTDRSB10A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.	4	110	Full
UETTDRSB11B	Maintain HV power system synchronous condensers	UETTDRSB11A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue	4	110	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				of an unrestricted electrician's licence.			
UETTDRSB1 2B	Maintain voltage regulating equipment – on load tapchangers	UETTDRSB 12A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.	4	110	Full
UETTDRSB1 3B	Install HV plant and equipment	UETTDRSB 13A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an	4	110	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				unrestricted electrician's licence.			
UETTDRSB14B	Carry out thermovision surveys	UETTDRSB14A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.	3	90	Full
UETTDRSB15B	Maintain discrete protection and control systems	UETTDRSB15A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted	4	110	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				electrician's licence.			
UETTDRSB16B	Commission discrete protection and control systems	UETTDRSB16A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRSB15B & A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.	4	110	Full
UETTDRSB17B	Maintain distribution field devices	UETTDRSB17A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue	4	110	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				of an unrestricted electrician's licence.			
UETTDRSB1 8B	Commission distribution field devices	UETTDRSB 18A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.	4	110	Full

Discipline – System Operations

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRSO 02B	Manage network	UETTDRSO 02A	Revised Unit	UETTDRSO 20A	6	220	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
	faults		includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDREL 01B UETTDREL 04B UETTDRLS2 2B UETTDRLS2 3B UETTDRLSO 04B UETTDRLSO 05B UETTDRLSO 07B UETTDRLSO 08B UETTDRLSO 10B UETTDRLSO 11B UETTDRLSO 12B UETTDRLSO 17A UETTDRLSO 18A UETTDRLSO 19A UEENED0 04B UEENEEE0 01B UEENEEE0 07B			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRSO 03B	Manage critical events	UETTDRSO 03A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRSO 02B UETTDRSO 01B UETTDRSO 04B UETTDRSO 22B UETTDRSO 23B UETTDRSO 04B UETTDRSO 05B UETTDRSO 07B UETTDRSO 08B UETTDRSO 10B UETTDRSO 11B UETTDRSO	6	220	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				12B UETTDRSO 17A UETTDRSO 18A UETTDRSO 19A UETTDRSO 20A UEENEED0 04B UEENEEE0 01B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRSO 04B	Control generating plant	UETTDRSO 04A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis	UETTDRSO 18A & UETTDRSO 19A UETTDRSO 01B UETTDRSO 04B	6	180	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			ites	UETTDRIS2 2B UETTDRIS2 3B UETTDRSO 07B UETTDRSO 08B UETTDRSO 10B UETTDRSO 17A UEENEED0 04B UEENEEE0 01B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRSO 05B	Manage HV distribution and subtransmission network	UETTDRSO 05A	Revised Unit includes editorial changes, reformatte	UETTDRSO 18A & UETTDRSO 19A UETTDREL	6	220	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
	demand		d unit layout and updated pre-requisites	01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2 3B UETTDRSO 07B UETTDRSO 08B UETTDRSO 10B UETTDRSO 17A UEENEE0 04B UEENEE0 01B UEENEE0 07B UEENEE0 24B UEENEE0 02B UEENEE0 47B UEENEE0 48B UEENEE0 49B			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRSO 06B	Develop LV distribution switching programs	UETTDRSO 06A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UEENEED0 04B & UEENEEE0 07B & UEENEEE0 24B & UEENEEG0 49B & UETTDRIS2 2B & UETTDRIS2 3B UETTDREL 01B UETTDREL 04B UEENEEE0 01B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B	5	150	Full
UETTDRSO 07B	Develop HV distribution and subtransmis sion switching programs	UETTDRSO 07A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis	UEENEED0 04B & UEENEEE0 07B & UEENEEE0 24B & UEENEEG0 49B & UETTDRIS2 2B & UETTDRIS2	5	150	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			ites	3B UETTDREL 01B UETTDREL 04B UEENEEE0 01B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B			
UETDRSO 08B	Develop and evaluate transmission switching programs	UETDRSO 08A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UEENEE0 04B & UEENEEE0 07B & UEENEEE0 24B & UEENEEG0 49B & UETDRIS2 2B & UETDRIS2 3B UETTDREL 01B UETTDREL 04B UEENEEE0 01B UEENEEG0	5	150	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				02B UEENEEG0 47B UEENEEG0 48B			
UETTDRSO 09B	Coordinate LV distribution networks	UETTDRSO 09A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRSO 06B UETTDRSO 01B UETTDRSO 04B UETTDRSO 22B UETTDRSO 23B UEENEEG0 04B UEENEEG0 01B UEENEEG0 07B UEENEEG0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B	5	150	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRSO 10B	Coordinate HV distribution and subtransmission networks	UETTDRSO 10A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRSO 07B UETTDRSO 01B UETTDRSO 04B UETTDRSO 22B UETTDRSO 33B UEENED0 04B UEENEEE0 01B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B	5	150	Full
UETTDRSO 11B	Manage transmission networks	UETTDRSO 11A	Revised Unit includes editorial changes, reformatted unit	UETTDRSO 18A & UETTDRSO 19A UETTDRSO 01B	6	200	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			layout and updated pre-requisites	UETTDREL04B UETTDRI22B UETTDRI23B UETTDRI07B UETTDRI08B UETTDRI10B UETTDRI17A UEENED004B UEENEEE001B UEENEEE007B UEENEEE024B UEENEEG002B UEENEEG047B UEENEEG048B UEENEEG049B			
UETTDRI12B	Manage transmission network demand	UETTDRI12A	Revised Unit includes editorial	UETTDRI11B UETTDREL	6	200	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			changes, reformatted unit layout and updated pre-requisites	01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2 3B UETTDRSO 07B UETTDRSO 08B UETTDRSO 10B UETTDRSO 17A UETTDRSO 18A UETTDRSO 19A UEENEED0 04B UEENEEE0 01B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRSO 13B	Coordinate LV distribution network demand	UETTDRSO 13A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRSO 09B UETTDRSO 01B UETTDRSO 04B UETTDRSO 22B UETTDRSO 33B UETTDRSO 06B UEENED0 04B UEENED0 01B UEENED0 07B UEENED0 24B UEENED0 02B UEENED0 47B UEENED0 48B UEENED0 49B	5	150	Full
UETTDRSO 14B	Develop crisis managemen t plans	UETTDRSO 14A	Revised Unit includes editorial changes,	UETTDRSO 03B UETTDRSO	6	180	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			reformatted unit layout and updated pre-requisites	01B UETTDREL 04B UETTDRLS2 2B UETTDRLS2 3B UETTDRLS0 02B UETTDRLS0 04B UETTDRLS0 05B UETTDRLS0 07B UETTDRLS0 08B UETTDRLS0 10B UETTDRLS0 11B UETTDRLS0 12B UETTDRLS0 17A UETTDRLS0 18A UETTDRLS0 19A UETTDRLS0 20A UEENED0 04B UEENEEE0 01B			

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRSO 15A	Operate and monitor system equipment (SCADA)	New Unit – Version 2	New Unit	UETTDRSO 05B UETTDRSO 01B UETTDRSO 04B UETTDRSO 2B UETTDRSO 3B UETTDRSO 07B UETTDRSO 08B UETTDRSO 10B UETTDRSO 17A UETTDRSO 18A UETTDRSO	5	150	

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				19A UEENEED0 04B UEENEEE0 01B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRSO 16A	Monitor and control the activities of field staff	New Unit – Version 2	New Unit	Nil	5	150	
UETTDRSO 17A	Coordinate HV transmission network	New Unit – Version 2	New Unit	UETTDRSO 08B UETTDREL 01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2 3B UEENEED0 04B	5	150	

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEE0 01B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRSO 18A	Respond to discrete/ interdepend ent protection operations	New Unit – Version 2	New Unit	UETTDRSO 10B OR UETTDRSO 17A UETTDREL 01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2 3B UETTDRSO 07B UETTDRSO 08B UEENEE0 04B UEENEEE0	5	150	

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				01B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRSO 19A	Coordinate system operations in a regulated energy market	New Unit – Version 2	New Unit	UETTDRSO 10B OR UETTDRSO 17A UETTDREL 01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2 3B UETTDRSO 07B UETTDRSO 08B UEENEE0 04B UEENEEE0 01B	5	150	

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRSO 20A	Respond to complex protection operations	New Unit – Version 2	New Unit	UETTDRSO 04B Or UETTDRSO 05B Or UETTDRSO 12B UETTDREL 01B UETTDREL 04B UETTDRIS2 2B UETTDRIS2 3B UETTDRSO 07B UETTDRSO 08B UETTDRSO 10B UETTDRSO	6	220	

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				11B UETTDRSO 17A UETTDRSO 18A UETTDRSO 19A UEENEE0 04B UEENEE0 01B UEENEE0 07B UEENEE0 24B UEENEE0 02B UEENEE0 47B UEENEE0 48B UEENEE0 49B			
UETTDRSO 21A	Manage network power flows	New Unit – Version 2	New Unit	UETTDRSO 02B UETTDREL 01B UETTDREL 04B UETTDRI2 2B UETTDRI2 3B	6	220	

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETTDRSO 04B UETTDRSO 05B UETTDRSO 07B UETTDRSO 08B UETTDRSO 10B UETTDRSO 11B UETTDRSO 12B UETTDRSO 17A UETTDRSO 18A UETTDRSO 19A			

Discipline – Transmission

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTD RTP 02B	Establish and reinstate a transmission tower work site	UETTD RTP 02A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UEENEEE0 01B & UETTDREL 03B	2	35	Full
UETTD RTP 03B	Erect transmission towers	UETTD RTP 03A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UEENEEE0 01B & UETTDREL 03B	2	Core	Full
UETTD RTP 04B	Erect transmission tower hardware	UETTD RTP 04A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTD RTP 03B UETTDREL 03B UEENEEE0 01B	2	30	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTD RTP 05B	Pre-tension stringing transmission overhead conductors and cables	UETTD RTP 05A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTD RTP 04B UETTD REL 03B UETTD RTP 03B UEENEEE0 01B	2	35	Full
UETTD RTP 06B	Erect transmission towers and associated hardware	UETTD RTP 06A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTD REL 01B & UETTD REL 02B & UETTD REL 04B & UEENEEE0 01B & UEENEEE0 02B & UEENEEE0 04B & UEENEEE0 05B & UEENEEE0 07B & UEENEEG0 01B & UEENEEG0 02B UEENEEE0 03B	3	100	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTD RTP 07B	Maintain transmission towers and associated hardware	UETTD RTP 07A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTD RTP 06B UETTD REL 01B UETTD REL 02B UETTD REL 04B UEENEEE0 01B UEENEEE0 02B UEENEEE0 03B UEENEEE0 04B UEENEEE0 05B UEENEEE0 07B UEENEEG0 01B UEENEEG0 02B	3	100	Full
UETTD RTP 08B	Transmission tower stub setting	UETTD RTP 08A	Revised Unit includes editorial changes, reformatted unit layout and updated	Nil	3	90	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			pre-requisites				
UETTD RTP 09B	Install and maintain overhead conductors and cables (towers).	UETTD RTP 09A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTD RTP 07B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTD RTP 06B UEENEEE0 01B UEENEEE0 02B UEENEEE0 03B UEENEEE0 04B UEENEEE0 05B UEENEEE0 07B UEENEEG0 01B UEENEEG0 02B	3	100	Full
UETTD RTP 10B	Inspect overhead structures and	UETTD RTP 10A	Revised Unit includes editorial	UETTD RTP 07B UETTDREL	3	100	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
	electrical apparatus (towers)		changes, reformatted unit layout and updated pre-requisites	01B UETTDREL 02B UETTDREL 04B UETTDRTTP 06B UEENEEE0 01B UEENEEE0 02B UEENEEE0 03B UEENEEE0 04B UEENEEE0 05B UEENEEE0 07B UEENEEG0 01B UEENEEG0 02B			
UETTDRTTP 11B	Maintain energised lines (transmission) using live line stick technique	UETTDRTTP 11A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	BSBWOR40 2A & UETTDRTTP 5B & UETTDRTTP 09B UETTDREL 01B UETTDREL 02B	4	130	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationsh ip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighti ng Points	Equivale nt - Full, part or not
				UETTDREL 04B UETTDRTTP 06B UETTDRTTP 07B UEENEEE0 01B UEENEEE0 02B UEENEEE0 03B UEENEEE0 04B UEENEEE0 05B UEENEEE0 07B UEENEEG0 01B UEENEEG0 02B			
UETTDRTTP 12B	Maintain energised lines (transmissi on) using Barehand Technique	UETTDRTTP 12A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requisi tes	UETTDRTTP 11B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRTTP 5B UETTDRTTP	4	130	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				06B UETTDRTTP 07B UETTDRTTP 09B UEENEEE0 01B UEENEEE0 02B UEENEEE0 03B UEENEEE0 04B UEENEEE0 05B UEENEEE0 07B UEENEEG0 01B UEENEEG0 02B BSBWOR40 2A			
UETTDRTTP 13B	Maintain energised lines (transmission) using Barehand Technique on a helicopter platform	UETTDRTTP 13A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRTTP 12B UETTDREL 01B UETTDREL 02B UETTDREL 04B UETTDRLS2 5B	4	130	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETTDRTTP 06B UETTDRTTP 07B UETTDRTTP 09B UETTDRTTP 11B UEENEEE0 01B UEENEEE0 02B UEENEEE0 03B UEENEEE0 04B UEENEEE0 05B UEENEEE0 07B UEENEEG0 01B UEENEEG0 02B BSBWOR40 2A			
UETTDRTTP 14B	Install and maintain overhead transmission network infrastructure	UETTDRTTP 14A	Revised Unit includes editorial changes, reformatted unit layout and updated	UETTDREL 02B & UETTDRTTP 2B & UETTDRTTP 3B & A current 'Unrestricted	4	120	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			pre-requisites	Electrician's Licence' or equivalent issued in an Australian State or Territory or satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence. UETTDREL 01B UETTDREL 04B UEENEEE0 01B			
UETTD RTP 15B	Install and maintain transmission network infrastructure electrical equipment	UETTD RTP 15A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTD RTP 14B & A current 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory or	4	130	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				<p>satisfaction of the ERAC requirements for the issue of an unrestricted electrician's licence.</p> <p>UETTDREL01B UETTDREL02B UETTDREL04B UETTDRIS22B UETTDRIS23B UEENEEE001B</p>			

Discipline – Protection/Testing

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRTS 01B	Maintain network protection and control systems (interdependent)	UETTDRTS 01A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRTS 09B UETTDREL 01B UETTDREL 04B UETTDRTS 22B UETTDRTS 33B UEENED0 04B UEENEEE0 01B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B	5	150	Full
UETTDRTS 02B	Commission network protection and control systems (Interdependent)	UETTDRTS 02A	Revised Unit includes editorial changes, reformatted unit	UETTDRTS 01B UETTDREL 01B UETTDREL	5	150	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			layout and updated pre-requisites	04B UETTDRI2 2B UETTDRI2 3B UETTDRTS 09B UEENED0 04B UEENEEE0 01B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRTS 03B	Conduct evaluation of power system faults within a substation	UETTDRTS 03A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UEENED0 04B & UEENEEE0 07B & UEENEEE0 24B & UEENEEG0 49B & UETTDRI2 2B & UETTDRI2 3B	6	180	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETTDREL 01B UETTDREL 04B UEENEEE0 01B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B			
UETTDRTS 04B	Design testing and commissioning procedures for substation and field devices	UETTDRTS 04A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRTS 06B or UETTDRTS 08B or UETTDRTS 12B or UETTDRTS 15B UETTDREL 01B UETTDREL 04B UETTDRTS 22B UETTDRTS 23B UETTDRTS 01B UETTDRTS 05B	6	180	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UETTDRTS 09B UEENEED0 04B UEENEEE0 01B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRTS 05B	Test and maintain metering schemes	UETTDRTS 05A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRTS 09B UETTDREL 01B UETTDREL 04B UETTDRI2 2B UETTDRI2 3B UEENEED0 04B UEENEEE0 01B UEENEEE0 07B	5	140	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRTS 06B	Commission metering schemes	UETTDRTS 06A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRTS 05B UETTDREL 01B UETTDREL 04B UETTDRTS 02B UETTDRTS 03B UETTDRTS 09B UEENEEG0 04B UEENEEE0 01B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0	5	150	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				47B UEENEEG0 48B UEENEEG0 49B			
UETTDRTS 07B	Perform accuracy checks on instrument transformers	UETTDRTS 07A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UEENEEG0 04B & UEENEEG0 07B & UEENEEG0 24B & UEENEEG0 49B & UETTDRTS 2B & UETTDRTS 3B UETTDREL 01B UETTDREL 04B UEENEEG0 01B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B	5	150	Full
UETTDRTS 08B	Test, repair and calibrate protection relays and	UETTDRTS 08A	Revised Unit includes editorial	UEENEEG0 04B & UEENEEG0 07B &	5	150	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
	meters		changes, reformatted unit layout and updated pre-requisites	UEENEEE0 24B & UEENEEG0 49B & UETTDRI2 2B & UETTDRI2 3B UETTDREL 01B UETTDREL 04B UEENEEE0 01B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B			
UETTDRTS 09B	Develop secondary isolation instructional documents	UETTDRTS 09A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UEENEE0 04B & UEENEEE0 07B & UEENEEE0 24B & UEENEEG0 49B & UETTDRI2 2B & UETTDRI2 3B UETTDREL	5	150	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				01B UETTDREL 04B UEENEEE0 01B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B			
UETTDRTS 10B	Design secondary isolation instructional documents	UETTDRTS 10A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UEENEE0 04B & UEENEEE0 07B & UEENEEE0 24B & UEENEEG0 49B & UETTDRTS 2B & UETTDRTS 3B UETTDREL 01B UETTDREL 04B UEENEEE0 01B UEENEEG0 02B UEENEEG0 47B UEENEEG0	6	200	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				48B			
UETTDRTS 11B	Maintain, test and commission voltage regulating equipment	UETTDRTS 11A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UEENEED0 04B & UEENEEE0 07B & UEENEEE0 24B & UEENEEG0 49B & UETTDRTS 2B & UETTDRTS 3B UETTDREL 01B UETTDREL 04B UEENEEE0 01B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B	4	150	Full
UETTDRTS 12B	Conduct evaluation of primary plant	UETTDRTS 12A	Revised Unit includes editorial changes, reformatted unit layout and	UETTDRTS 09B UETTDREL 01B UETTDREL 04B	6	200	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			updated pre-requisites	UETTDNIS2 2B UETTDNIS2 3B UEENED0 04B UEENEEE0 01B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRTS 13B	Undertake project management of substation augmentation and maintenance	UETTDRTS 13A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRTS 06B or UETTDRTS 08B or UETTDRTS 12B or UETTDRTS 15B UETTDREL 01B UETTDREL 04B UETTDNIS2	6	220	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				2B UETTDRI2 3B UETTDRTS 01B UETTDRTS 05B UETTDRTS 09B UEENED0 04B UEENEEE0 01B UEENEEE0 07B UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRTS 14B	Install and maintain power system communication equipment	UETTDRTS 14A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requis	UEENED0 04B & UEENEEE0 07B & UEENEEE0 24B & UEENEEG0 49B & UETTDRI2 2B &	5	150	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			ites	UETTDNIS2 3B UETTDREL 01B UETTDREL 04B UEENEEE0 01B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B			
UETTDRTS 15B	Maintain network protection and control systems (Complex)	UETTDRTS 15A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRTS 01B UETTDREL 01B UETTDREL 04B UETTDNIS2 2B UETTDNIS2 3B UETTDRTS 09B UEENEE0 04B UEENEEE0 01B UEENEEE0 07B	6	220	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				UEENEEE0 24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			
UETTDRTS 16B	Commission network protection and control systems (complex)	UETTDRTS 16A	Revised Unit includes editorial changes, reformatte d unit layout and updated pre-requis ites	UETTDRTS 02B & UETTDRTS 15B UETTDREL 01B UETTDREL 04B UETTDRTS 22B UETTDRTS 23B UETTDRTS 01B UETTDRTS 09B UEENEE0 04B UEENEEE0 01B UEENEEE0 07B UEENEEE0	6	220	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				24B UEENEEG0 02B UEENEEG0 47B UEENEEG0 48B UEENEEG0 49B			

Discipline – Vegetation

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRVC 01B	Cut vegetation above ground outside live work zone near live electrical apparatus (climbing)	UETTDRVC 01A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRVC 07B UETTDRELO 3B UETTDRELO 4B UETTDRVC 02B UETTDRVC 03B UEENEEE00 1B	2	35	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRVC 02B	Operate vegetation control plant, machinery and equipment near live electrical apparatus	UETTDRVC 02A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRVC 03B UETTDRELO 3B UETTDRELO 4B UEENEEE00 1B	2	Core	Full
UETTDRVC 03B	Plan for the removal of vegetation up to vegetation exclusion zone near live electrical apparatus	UETTDRVC 03A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UEENEEE00 1B & UETTDRELO 3B & UETTDRELO 4B	2	Core	Full
UETTDRVC 04B	Assess vegetation and recommend control measures for work near live electrical apparatus	UETTDRVC 04A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRVC 01B OR UETTDRVC 05B OR UETTDRVC 06B OR UETTDRVC 08B UETTDRELO 3B UETTDRELO	2	35	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
				4B UETTDRVC 02B UETTDRVC 03B UETTDRVC 07B UEENEEE00 1B			
UETTDRVC 05B	Cut vegetation above ground outside live work zone near live electrical apparatus (platform)	UETTDRVC 05A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRVC 07B UETTDRELO 3B UETTDRELO 4B UETTDRVC 02B UETTDRVC 03B UEENEEE00 1B	2	30	Full
UETTDRVC 06B	Cut vegetation at ground level outside 'vegetation exclusion zone' near live electrical apparatus	UETTDRVC 06A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRVC 07B UETTDRELO 3B UETTDRELO 4B UETTDRVC 02B UETTDRVC 03B	2	30	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
	s			UEENEEE001B			
UETTDRCV07B	Monitor safety compliance for vegetation work near live electrical apparatus	UETTDRCV07A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRCV02B UETTDRELO3B UETTDRELO4B UETTDRCV03B UEENEEE001B	2	Core	Full
UETTDRCV08B	Safe use of Elevating Work Platform (EWP) near live electrical apparatus	UETTDRCV08A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRCV07B UETTDRELO3B UETTDRELO4B UETTDRCV02B UETTDRCV03B UEENEEE001B	2	35	Full
UETTDRCV09B	Control vegetation (linework)	UETTDRCV09A	Revised Unit includes editorial changes, reformatted unit	UETTDRCV04B UETTDRELO1B UETTDRELO	3	80	Full

UET09 Version 1 CSU Code	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			layout and updated pre-requisites	2B UETTDRELO4B UETTDRIS12B UEUNEEE001B UEUNEEE002B UEENEEE003B UEENEEE004B UEENEEE005B UEENEEE007B UEENEEG001B			
UETTDRVC10B	Coordinate vegetation control work	UETTDRVC10A	Revised Unit includes editorial changes, reformatted unit layout and updated pre-requisites	UETTDRIS22B & UETTDRIS23B UETTDRELO1B UETTDRELO4B UEENEEE001B	4	120	Full

Table 4 — Replacement of Universal Electrotechnology Units with Imported Units

The Universal Electrotechnology (UEU) Units have been replaced with units imported from UEE07 Electrotechnology Training Package. This table indicates relevant equivalences and points weightings for the imported units.

Unit Imported to Replace UEU Unit in UET09 Version 1	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship to units in the former Training Package	Prerequisite requirements of Imported Unit	AQF	Weighting Points	Equivalent - Full, part or not
		UEUNEEDED002A	Unit Deleted from UET09 V1				
UEENEEDED004B	Use engineering applications software	UEUNEEDED004A	Unit Deleted from UET09 V1 and replaced by imported unit	Nil	2	Core	Full
UEENEEDED017B	Install and configure internetworking systems	UEUNEEDED017A	Unit Deleted from UET09 V1 and replaced by imported unit	Nil	4	160	Full
UEENEEDED027B	Develop structured programs to control external devices	UEUNEEDED027A	Unit Deleted from UET09 V1 and replaced by imported unit	Nil	3/4	80	Full
UEENEEDED028B	Develop and test code for microcontroll	UEUNEEDED028A	Unit Deleted from	Nil	5/6	100	Full

Unit Imported to Replace UEU Unit in UET09 Version 1	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship to units in the former Training Package	Prerequisite requirements of Imported Unit	AQF	Weighting Points	Equivalent - Full, part or not
	er devices		UET09 V1 and replaced by imported unit				
UEENEEE001B	Apply OHS practices in the work place	UEUNEEE001A	Unit Deleted from UET09 V1 and replaced by imported unit	Nil	1/2	Core	Full
UEENEEE002B	Dismantle, assemble and fabricate electrotechnology components	UEUNEEE002A	Unit Deleted from UET09 V1 and replaced by imported unit	Nil	1/2	Core	Full
UEENEEE003B	Solve problems in extra-low voltage single path circuits	UEUNEEE003A	Unit Deleted from UET09 V1 and replaced by imported unit	Nil	1/2	Core	Full
UEENEEE004B	Solve problems in multiple path d.c. circuits	UEUNEEE004A	Unit Deleted from UET09 V1 and replaced	UEENEEE003B	1/2	Core	Full

Unit Imported to Replace UEU Unit in UET09 Version 1	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship to units in the former Training Package	Prerequisite requirements of Imported Unit	AQF	Weighting Points	Equivalent - Full, part or not
			by imported unit				
UEENEEE005B	Fix and secure equipment	UEUNEEE005A	Unit Deleted from UET09 V1 and replaced by imported unit	Nil	1/2/3	Core	Full
UEENEEE007B	Use drawings, diagrams, schedules and manuals	UEUNEEE007A	Unit Deleted from UET09 V1 and replaced by imported unit	Nil	2	Core	Full
UEENEEE008B	Lay wiring/cablin g and terminate accessories for extra-low voltage circuits	UEUNEEE008A	Unit Deleted from UET09 V1 and replaced by imported unit	UEENEEE005B & UEENEEE007B	2	80	Full
UEENEEG001B	Solve problems in electromagnetic circuits	UEUNEEG001A	Unit Deleted from UET09 V1 and replaced by imported unit	Nil	3	Core	Full

Unit Imported to Replace UEU Unit in UET09 Version 1	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship to units in the former Training Package	Prerequisite requirements of Imported Unit	AQF	Weighting Points	Equivalent - Full, part or not
UEENEEG002B	Solve problems in single and three phase low voltage circuits	UEUNEEG002A	Unit Deleted from UET09 V1 and replaced by imported unit	Nil	3	Core	Full
UEENEEG047B	Provide computational solutions to power engineering problems	UEUNEEG047A	Unit Deleted from UET09 V1 and replaced by imported unit	UEENEEG002B	4/5	Core	Full
UEENEEG048B	Solve problems in complex multiple path power circuits	UEUNEEG048A	Unit Deleted from UET09 V1 and replaced by imported unit	UEENEEG047B	4/5	Core	Full
UEENEEG049B	Solve problems in complex polyphase power circuits	UEUNEEG049A	Unit Deleted from UET09 V1 and replaced by imported unit	UEENEEG048B	5/6	Core	Full
UEENEEH002B	Carry out basic repairs to electronic	UEUNEEH002A	Unit Deleted from	UEENEEH002B	2/3	80	Full

Unit Imported to Replace UEU Unit in UET09 Version 1	Unit Title	UET06 Version 1 Competency Standard Unit Code	Relationship to units in the former Training Package	Prerequisite requirements of Imported Unit	AQF	Weighting Points	Equivalent - Full, part or not
	apparatus by replacement of components		UET09 V1 and replaced by imported unit				
		UEUNEEH0 11A	Unit Deleted from UET09 V1				
UEENEEH0 12B	Troubleshoot digital subsystems	UEUNEEH0 12A	Unit Deleted from UET09 V1 and replaced by imported unit	UEENEEH0 02B	3	120	Full
UEENEEH0 39B	Troubleshoot basic amplifiers	UEUNEEH0 39A	Unit Deleted from UET09 V1 and replaced by imported unit	UEENEEH0 02B & UEENEEH0 14B or UEENEEG0 02B	3	80	Full
		UEUNEEH0 70A	Unit Deleted from UET09 V1				

Table 6 Relationship between UET06 Version 1 Units and UTT98 Version 3 Units

This table includes the relationship of UET06 Version 1 units to units in the former Training Package UTT98 Version 3 and Unit weighting points

Discipline – Cable Jointing

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
UETTDRCJ01A	Lay electrical cables	New Unit – Version 1	New Unit	UETTDRELO1A UETTDRELO2A UETTDRELO4A UEENEEE001A UEENEEE002A UEENEEG002A UEENEEE008A	2	30	Not
UETTDRCJ02A	Install and maintain de-energised LV underground paper insulated cables	UTTNTD307A	Minor resemblance to previous unit. Unit has been updated, realigned and reformatted.	UETTDRCJ01A	3	100	Part
UETTDRCJ03A	Install and maintain de-energised HV underground paper insulated	UTTNTD307A	Minor resemblance to previous unit. Unit has	UETTDRCJ01A	3	100	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
	cables.		been updated, realigned and reformatted.				
UETTDRCJ04A	Joint and maintain energised LV underground paper insulated cables	UTTNTD307A	Minor resemblance to previous unit. Unit has been updated, realigned and reformatted.	UETTDRCJ02A	3	100	Part
UETTDRCJ05A	Perform straight through HV paper insulated to polymeric transition joint	New Unit	New Unit	UETTDRCJ07A	3	90	Part
UETTDRCJ06A	Install and maintain de-energised LV underground polymeric cables	UTTNTD320A	Minor resemblance to previous unit. Unit has been updated, realigned and	UETTDRCJ01A	3	90	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			reformatted.				
UETTDRCJ0 7A	Install and maintain de-energised HV underground polymeric cables	UTTNTD320A	Minor resemblance to previous unit. Unit has been updated, realigned and reformatted.	UETTDRCJ06A	3	90	Part
UETTDRCJ0 8A	Joint and maintain energised LV underground polymeric cables	UTTNTD320A	Minor resemblance to previous unit. Unit has been updated, realigned and reformatted.	UETTDRCJ06A	3	90	Part
UETTDRCJ0 9A	Install oil and gas filled specialised underground cables	UTTNTD405A	Minor resemblance to previous unit. Unit has been updated, realigned and reformatted.	UETTDRCJ03A & UETTDRCJ07A	4	120	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
			d.				
UETTDRCJ10A	Maintain oil and gas filled specialised underground cables	New Unit	New Unit	UETTDRCJ09A	4	120	Not
UETTDRCJ11A	Install and maintain polymeric specialised underground cables	UTTNTD405A	Minor resemblance to previous unit. Unit has been updated, realigned and reformatted.	UETTDRCJ03A & UETTDRCJ07A	4	130	Part
UETTDRCJ12A	Install and maintain oil and gas pressure systems for specialised underground cables	UTTNTD405A	Minor resemblance to previous unit. Unit has been updated, realigned and reformatted.	UETTDRCJ03A & UETTDRCJ07A	4	130	Part
UETTDRCJ13A	Install and maintain network infrastructure LV underground	New Unit	New Unit	UETTDRI06A	4	120	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F.	Weighting Points	Equivalent - Full, part or not
	nd cables						
UETTDRCJ1 4A	Install and maintain network infrastructure HV underground cables	New Unit	New Unit	UETTDRCJ1 3A	4	130	Not

Discipline – Distribution

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align. n.	Weighting Points	Equivalent - Full, part or not
UETTDSDP0 1A	Inspect overhead structures and electrical apparatus (poles and structures)	UTTNTD30 3A	Minor resemblance to previous unit. Unit has been updated, realigned and reformatted.	UETTDSDP0 2A	3	90	Part
UETTDSDP0 2A	Maintain overhead energised LV conductors	UTTNTD30 6A	Minor resemblance to previous unit.	UETTDSDP0 4A	3	100	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
	and cables		Unit has been updated, realigned and reformatt ed.				
UETTDRDP0 3A	Maintain energised high voltage distributio n overhead electrical apparatus (Stick)	UTTNTD40 4A	Minor resemblan ce to previous unit. Unit has been updated, realigned and reformatt ed.	BSBFLM412 A & UETTDRDP0 2A & UETTDRIS0 2A & UETTDRIS2 5A	4	130	Part
UETTDRDP0 4A	Maintain energised high voltage distributio n overhead electrical apparatus (Glove)	UTTNTD40 4A	Minor resemblan ce to previous unit. Unit has been updated, realigned and reformatt ed.	BSBFLM412 A & UETTDRDP0 2A & UETTDRIS0 2A & UETTDRIS2 5A	4	130	Part
UETTDRDP0 5A	Inspect, maintain and restore energised LV overhead	New Unit	New Unit	UETTDRIS0 6A UETTDRIS2 7A	4	130	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
	distributio n network infrastruct ure						

Discipline – Design

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
UETTDRDS 01A	Draft and layout an overhead distribution extension	UTTNTD4 02A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDRIS22 A & UETTDRIS23 A & UEENEEE002 A & UEENEEE019 A & UEENEEE008 A	4	110	Part
UETTDRDS 02A	Draft and layout an underground distribution extension	UTTNTD4 03A	Minor resembla nce to previous unit. Unit has been updated, realigned and	UETTDRIS22 A & UETTDRIS23 A & UEENEEE002 A & UEENEEG002 A & UEENEEE008	4	110	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
			reformatt ed.	A			
UETTDRDS 03A	Draft and layout a street Lighting system	UTTNTD4 21A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDRIS22 A & UETTDRIS23 A & UEENEEE002 A & UEENEEG002 A & UEENEEE008 A &	4	110	Part
UETTDRDS 04A	Draft and layout a distribution substation minor upgrade	UTTNTD4 03A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDRIS22 A & UETTDRIS23 A & UEENEEE002 A & UEENEEG002 A & UEENEEE008 A	4	120	Part
UETTDRDS 05A	Design overhead distribution systems	New Unit	New Unit	UETTDRDS1 5A& UETTDRDS1 3A	5	140	Not
UETTDRDS 06A	Design underground distribution systems	New Unit	New Unit	UETTDRDS1 5A& UETTDRDS1 3A	5	140	Not
UETTDRDS 07A	Design distribution	New Unit	New Unit	UETTDRDS1 5A&	5	140	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
	substations			UETTDRDS1 3A			
UETTDRDS 08A	Design public lighting systems	New Unit	New Unit	UETTDRDS1 5A & UETTDRDS1 3A	5	140	Not
UETTDRDS 09A	Prepare and manage detailed construction plans for electrical system infrastructur e	New Unit	New Unit	BSBMGT507 A and UEENEED002 A & UEENEED004 A & UEENEED027 A & UEENEEE002 A & UEENEEE007 A & UEENEEG049 A & UEENEEH011 A & UEENEEH012 A & UEENEEH039 A & UEENEEH070 A & UETTDRIS26 A	5	140	Not
UETTDRDS 10A	Prepare and appraise financial impact statements	New Unit	New Unit	UETTDRDS2 0A or UETTDRDS2 1A or UETTDRDS2	6	200	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
				2A or UETTDRDS2 3A or UETTDRDS2 4A or UETTDRDS2 5A or UETTDRDS2 6A or UETTDRDS2 7A or UETTDRDS2 8A			
UETTDRDS 11A	Manage electrical infrastructur e projects	New Unit	New Unit	UETTDRDS1 0A	6	200	Not
UETTDRDS 12A	Investigate quality of supply issues	New Unit	New Unit	BSBMGT507 A & UEENEED002 A & UEENEED004 A & UEENEED027 A & UEENEEE002 A & UEENEEE007 A & UEENEEG049 A & UEENEEH011 A & UEENEEH012 A & UEENEEH039	5	140	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
				A & UEENEEH070 A & UETTDRIS26 A			
UETTDRDS 13A	Develop HV and LV distribution protection systems	New Unit	New Unit	BSBMGT507 A & UEENEEED002 A & UEENEEED004 A & UEENEEED027 A & UEENEEEEE002 A & UEENEEEEE007 A & UEENEEEG049 A & UEENEEEH011 A & UEENEEEH012 A & UEENEEEH039 A & UEENEEEH070 A & UETTDRIS26 A	5	150	Not
UETTDRDS 14A	Design zone substations modification s	New Unit	New Unit	BSBMGT507 A & UEENEEED002 A & UEENEEED004 A &	5	160	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
				UEENEED027 A & UEENEEE002 A & UEENEEE007 A & UEENEEG049 A & UEENEEH011 A & UEENEEH012 A & UEENEEH039 A & UEENEEH070 A & UETTDRIS26 A			
UETTDRDS 15A	Organise and implement line and easement surveys	New Unit	New Unit	UETTDRDS0 5A & UETTDRDS0 6A	5	140	Not
UETTDRDS 16A	Develop planned outage strategies	New Unit	New Unit	BSBMGT507 A & UEENEED002 A & UEENEED004 A & UEENEED027 A & UEENEEE002 A & UEENEEE007 A &	5	140	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
				UEENEEG049 A & UEENEEH011 A & UEENEEH012 A & UEENEEH039 A & UEENEEH070 A & UETTDRIS26 A			
UETTDRDS 17A	Review asset management strategies	New Unit	New Unit	UETTDRDS1 0A	6	180	Not
UETTDRDS 18A	Analyse and appraise fault and outage data	New Unit	New Unit	UETTDRDS1 7A	6	180	Not
UETTDRDS 19A	Establish and manage geographica l information systems data	New Unit	New Unit	BSBMGT507 A & UEENEEED002 A & UEENEEED004 A & UEENEEED027 A & UEENEEED002 A & UEENEEED007 A & UEENEEG047 A & UEENEEH011	5	140	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
				A & UEENEEH012 A & UEENEEH039 A & UEENEEH070 A & UETTDRIS26 A			
UETTDRDS 20A	Design customer substations	New Unit	New Unit	BSBMGT507 A & UEENEEH012 A & UEENEEH039 A & UEENEEH070 A & UETTDRIS26 A & UEENEEH011 A & UEENEEH012 A & UEENEEH039 A & UEENEEH070 A & UETTDRIS26 A	5	150	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
				A & UETTDRDS0 7A			
UETTDRDS 21A	Manage transmission and subtransmis sion design process	New Unit	New Unit	BSBMGT507 A & UEENEED002 A & UEENEED004 A & UEENEED017 A & UEENEED027 A & UEENEED028 A & UEENEEE002 A & UEENEEE007 A & UEENEEG049 A & UEENEEH011 A & UEENEEH012 A & UEENEEH039 A & UEENEEH070 A & UETTDRIS26 A & UETTDRDS0 9A & UETTDRDS1 4A	6	180	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
UETTDRDS 22A	Design transmission , subtransmis sion and zone substation buildings	New Unit	New Unit	BSBMGT507 A & UEENEED002 A & UEENEED004 A & UEENEED017 A & UEENEED027 A & UEENEED028 A & UEENEEE002 A & UEENEEE007 A & UEENEEG049 A & UEENEEH011 A & UEENEEH012 A & UEENEEH039 A & UEENEEH070 A & UETTDRIS26 A & UETTDRDS0 9A & UETTDRDS1 4A	6	200	Not
UETTDRDS 23A	Design transmission and subtransmis	New Unit	New Unit	BSBMGT507 A & UEENEED002	6	220	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
	sion substation primary plant			A & UEENEEED004 A & UEENEEED017 A & UEENEEED027 A & UEENEEED028 A & UEENEEEE002 A & UEENEEEE007 A & UEENEEEG049 A & UEENEEEH011 A & UEENEEEH012 A & UEENEEEH039 A & UEENEEEH070 A & UETTDRIS26 A & UETTDRDS0 9A & UETTDRDS1 4A			
UETTDRDS 24A	Design transmission and subtransmis sion protection and control	New Unit	New Unit	BSBMGT507 A & UEENEEED002 A & UEENEEED004 A & UEENEEED017	6	220	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
				A & UEENEE027 A & UEENEE028 A & UEENEE002 A & UEENEE007 A & UEENEE049 A & UEENEE011 A & UEENEE012 A & UEENEE039 A & UEENEE070 A & UETTDRIS26 A & UETTDRDS0 9A & UETTDRDS1 4A			
UETTDRDS 25A	Design transmission and subtransmis sion substation earthing	New Unit	New Unit	BSBMGT507 A & UEENEE002 A & UEENEE004 A & UEENEE017 A & UEENEE027 A & UEENEE028	6	200	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
				A & UEENEEE002 A & UEENEEE007 A & UEENEEG049 A & UEENEEH011 A & UEENEEH012 A & UEENEEH039 A & UEENEEH070 A & UETTDRIS26 A & UETTDRDS0 9A & UETTDRDS1 4A			
UETTDRDS 26A	Design transmission , subtransmis sion and zone substation – civil and structural components	New Unit	New Unit	BSBMGT507 A & UEENEEED002 A & UEENEEED004 A & UEENEEED017 A & UEENEEED027 A & UEENEEED028 A & UEENEEE002 A & UEENEEE007	6	200	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
				A & UEENEEG049 A & UEENEEH011 A & UEENEEH012 A & UEENEEH039 A & UEENEEH070 A & UETTDRIS26 A & UETTDRDS0 9A & UETTDRDS1 4A			
UETTDRDS 27A	Design overhead transmission systems	New Unit	New Unit	BSBMGT507 A & UEENEEED002 A & UEENEEED004 A & UEENEEED017 A & UEENEEED027 A & UEENEEED028 A & UEENEEEE002 A & UEENEEEE007 A & UEENEEG049 A & UEENEEH011	6	200	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
				A & UEENEEH012 A & UEENEEH039 A & UEENEEH070 A & UETTDRIS26 A & UETTDRDS1 5A			
UETTDRDS 28A	Design underground transmission systems	New Unit	New Unit	BSBMGT507 A & UEENEEH002 A & UEENEEH004 A & UEENEEH017 A & UEENEEH027 A & UEENEEH028 A & UEENEEH002 A & UEENEEH007 A & UEENEEH049 A & UEENEEH011 A & UEENEEH012 A & UEENEEH039 A & UEENEEH070	6	200	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comment s to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
				A & UETTDRIS26 A & UETTDRDS1 5A			

Discipline – Entry Level Cross Discipline

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisi te requireme nts (for relevant pre-requis ite or co-requisit e refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
UETTDREL 01A	Apply environment and sustainable energy procedures	UTTNTD3 21A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	Nil	3	Core	Part
UETTDREL 02A	Operate plant and equipment near live electrical conductors/appa	UTTNTD2 02A	Minor resembla nce to previous unit.	Nil	3	Core	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisi te requireme nts (for relevant pre-requis ite or co-requisit e refer respective unit)	AQ F Align n.	Weighti ng Points	Equival ent - Full, part or not
	ratus		Unit has been updated, realigned and reformatted.				
UETTDREL03A	Comply with environmental and incidence response procedures	UTTNTD321A	Minor resemblance to previous unit. Unit has been updated, realigned and reformatted.	Nil	2	Core TLA and Possible Skill Sets Unit	Part
UETTDREL04A	Working safely near live electrical apparatus as non electrical worker	New Unit	New Unit	Nil	2	Core TLA and Possible Skill Sets Unit	Not

Discipline – Industry Specific

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align. n.	Weighti ng Points	Equivale nce - Full, part or not
UETTDRI S01A	Install electrical equipment (Network Infrastructur e)	UTTNTD30 8A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDREL 01A & UETTDREL 02A & UETTDREL 04A & UEENEEE0 01A & UEENEEE0 02A & UEENEEG0 02A & UEENEEE0 08A	3	100	Part
UETTDRI S02A	Maintain electrical equipment (Network Infrastructur e)	UTTNTD30 8A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDRI S01A	3	100	Part
UETTDRI S03A	Perform LV field switching operation to a given	UTTNTD30 9A	Minor resembla nce to previous unit.	UETTDRCJ 03A or UETTDRCJ 07A or UETTDRI S01A	3	80	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equivale nce - Full, part or not
	schedule		Unit has been updated, realigned and reformatt ed.	2A or UETTDRIS1 4A or UETTDRTPO 9A			
UETTDRIS 04A	Perform HV field switching operations to a given schedule	UTTNTD31 0A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDRCJ0 3A or UETTDRCJ0 7A or UETTDRIS0 2A or UETTDRIS1 4A or UETTDRTPO 9A	3	80	Part
UETTDRIS 05A	Perform substation switching operation to a given schedule	New Unit	New Unit	UETTDRCJ0 3A or UETTDRCJ0 7A or UETTDRIS0 2A or UETTDRIS1 4A or UETTDRTPO 9A	3	80	Not
UETTDRIS 06A	Install and maintain network infrastructur e electrical equipment	New Unit	New Unit	UETTDREL 01A & UETTDREL 02A & UETTDREL 04A &	4	110	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equivale nce - Full, part or not
				UETTDRIS2 2A & UETTDRIS2 3A & UEENEEG00 5A			
UETTDRIS 07A	Sample, test, filter, and reinstate insulating oil	UTTNTD20 4A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UEENEEG00 5A	3	80	Part
UETTDRIS 08A	Develop HV switching schedule	New Unit	New Unit	UETTDRIS0 3A or UETTDRIS0 4A or UETTDRIS0 5A or UETTDRRT 10A	4	110	Not
UETTDRIS 09A	Develop LV switching schedule	New Unit	New Unit	UETTDRIS0 3A or UETTDRIS0 4A or UETTDRIS0 5A or UETTDRRT 10A	4	110	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equivale nce - Full, part or not
UETTDRIS 10A	Coordinate permit procedures	New Unit	New Unit	UETTDRIS0 3A or UETTDRIS0 4A or UETTDRIS0 5A or UETTDRRT 10A	4	120	Not
UETTDRIS 11A	Coordinate and direct switching schedules	New Unit	New Unit	UETTDRIS0 3A or UETTDRIS0 4A or UETTDRIS0 5A or UETTDRRT 10A	4	110	Not
UETTDRIS 12A	Install and maintain poles/struct ures and associated hardware	UTTNTD30 1A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDREL 01A & UETTDREL 02A & UETTDREL 04A & UEENEEE00 1A & UEENEEE00 2A & UEENEEG00 2A & UEENEEE00 8A	3	90	Part
UETTDRIS 13A	Install and maintain public lighting	UTTNTD30	Minor resembla nce to	UETTDRCJ0 3A or UETTDRCJ0 7A or	3	80	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equivale nce - Full, part or not
	systems	4A	previous unit. Unit has been updated, realigned and reformatted.	UETTDRIS02A or UETTDRIS14A or UETTDRTPO9A			
UETTDRIS14A	Install & maintain overhead conductors and cables (Poles and Structures)	UTTNTD305A	Minor resemblance to previous unit. Unit has been updated, realigned and reformatted.	UETTDRIS12A	3	100	Part
UETTDRIS15A	Install and maintain low voltage services (Underground)	New Unit	New Unit	UETTDRCJ03A or UETTDRCJ07A or UETTDRIS02A or UETTDRIS14A or UETTDRTPO9A	3	80	Not
UETTDRIS16A	Install and maintain low voltage services	New Unit	New Unit	UETTDRCJ03A or UETTDRCJ07A or	3	80	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equivale nce - Full, part or not
	(overhead)			UETTDRIS0 2A or UETTDRIS1 4A or UETTDRTPO 9A			
UETTDRIS 17A	Conduct visual checking and treatment of poles and structures	UTTNTD20 6A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDRIS1 2A	2	40	Part
UETTDRIS 18A	Locate faults in undergroun d power cables	UTTNTD32 2A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDRCJ0 3A or UETTDRCJ0 7A or UETTDRIS0 2A or UETTDRIS1 4A or UETTDRTPO 9A	4	110	Part
UETTDRIS 19A	Conduct high potential testing of undergroun d power	New Unit	New Unit	UETTDRCJ0 3A or UETTDRCJ0 7A or UETTDRIS0	3	90	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equivale nce - Full, part or not
	cables			2A or UETTDRIS1 4A or UETTDRTPO 9A			
UETTDRIS 20A	Install and replace energy meters and associated equipment	UTTNTD31 1A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDRCJ0 3A or UETTDRCJ0 7A or UETTDRIS0 2A or UETTDRIS1 4A or UETTDRTPO 9A	3	90	Part
UETTDRIS 21A	Install mobile Generation set for synchronise d Genset LV	New Unit	New Unit	UETTDRCJ0 3A or UETTDRCJ0 7A or UETTDRIS0 2A or UETTDRIS1 4A or UETTDRTPO 9A	3	90	Not
UETTDRIS 22A	Implement and monitor the organisation al OHS policies, procedures and	UTTNTD41 3A	Minor resembla nce to previous unit. Unit has been updated,	UEENEEE00 1A & UETTDREL 04A	4	Core	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equivale nce - Full, part or not
	programs		realigned and reformatt ed.				
UETTDRIS 23A	Implement and monitor environment al and sustainable energy managemen t policies and procedures	UTTNTD41 4A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDREL 01A	4	Core	Part
UETTDRIS 24A	Install mobile Generation set for synchronise d genset HV	New Unit	New Unit	UETTDRIS0 3A or UETTDRIS0 4A or UETTDRIS0 5A or UETTDRRT 10A & UETTDRIS2 1A	3	90	Not
UETTDRIS 25A	Contribute to coordinated High Voltage live line work	New Unit	New Unit	Nil	3	100	Not
UETTDRIS 26A	Manage an electricity supply	New Unit	New Unit	Nil	5	Core	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQ F Align n.	Weighti ng Points	Equivale nce - Full, part or not
	industry OHS managemen t system						
UETTDNIS 27A	Install and maintain network infrastructur e electrical equipment	New Unit	New Unit	UETTDREL 01A & UETTDREL 02A & UETTDREL 04A & UETTDNIS2 2A & UETTDNIS2 3A & UEENEEG00 5A	4	120	Not

Discipline – Rail Traction

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
UETTDNRT 01A	Install overhead traction wiring systems	UTTNND32 3A	Minor resembla nce to previous unit. Unit has been updated,	UETTDNIS1 4A	3	90	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
			realigned and reformatt ed.				
UETTDRRT 02A	Maintain overhead traction wiring systems	UTTNTD32 3A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDRRT 01A	3	100	Part
UETTDRRT 03A	Install traction bonds	UTTNTD32 4A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDRIS1 4A	3	80	Part
UETTDRRT 04A	Maintain traction bonds	UTTNTD32 4A	Minor resembla nce to previous unit. Unit has been updated, realigned	UETTDRRT 03A	3	90	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
			and reformatt ed.				
UETDRRT 05A	Install overhead traction configurati ons	UTTNTD32 5A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETDRRT 02A & UETDRRT 08A	3	90	Part
UETDRRT 06A	Maintain overhead traction configurati ons	UTTNTD32 5A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETDRRT 05A	3	100	Part
UETDRRT 07A	Install overhead traction equipment and component s	UTTNTD32 6A	Minor resembla nce to previous unit. Unit has been updated, realigned and	UETDRIS1 4A	3	90	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
			reformatt ed.				
UETDRRT 08A	Maintain overhead traction equipment and component s	UTTNTD32 6A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETDRRT 07A	3	100	Part
UETDRRT 09A	Operate road rail traction height access equipment	UTTNTD32 7A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETDRRT 02A & UETDRRT 08A	2	40	Part
UETDRRT 10A	Perform rail traction switching operation to a given schedule	New Unit	New Unit	UETDRRT 02A & UETDRRT 08A	3	80	Not
UETDRRT 11A	Maintain energised DC traction overhead wiring	New Unit	New Unit	BSBFLM412 A & UETDRIS2 5A &	4	120	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
	system			UETDRRT 06A & UETDRRT 09A			
UETDRRT 12A	Maintain energised traction overhead electrical apparatus (Stick)	New Unit	New Unit	UETDRRT 11A	4	130	Not
UETDRRT 13A	Maintain energised traction overhead electrical apparatus (Glove)	New Unit	New Unit	UETDRRT 11A	4	130	Not
UETDRRT 14A	Install and maintain traction network wiring systems	New Unit	New Unit	UETDRIS2 7A	4	110	Not
UETDRRT 15A	Install and maintain traction network equipment & component s	New Unit	New Unit	UETDRRT 14A	4	130	Not

Discipline – Substation

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relationsh ip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
UETTDRSB0 1A	Diagnose and rectify faults in power systems substation environme nt	New Unit	New Unit	UEENEEG00 5A	4	Core	Not
UETTDRSB0 2A	Carry out substation inspections	New Unit	New Unit	UEENEEG00 5A	4	Core	Not
UETTDRSB0 3A	Install and maintain substation DC systems	New Unit	New Unit	UEENEEG00 5A	4	Core	Not
UETTDRSB0 4A	Maintain HV power system circuit breakers	New Unit	New Unit	UEENEEG00 5A	4	Core	Not
UETTDRSB0 5A	Maintain HV power system – transformer s & instrument transformer s	New Unit	New Unit	UEENEEG00 5A	4	Core	Not
UETTDRSB0 6A	Install high current DC switchgear & equipment	New Unit	New Unit	UEENEEG00 5A	4	110	Not
UETTDRSB0 7A	Maintain high	New Unit	New Unit	UEENEEG00 5A	4	110	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relationsh ip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
	current DC switchgear & equipment						
UETTDRSB0 8A	RESERVE D						
UETTDRSB0 9A	Maintain HV regulating equipment – capacitor banks	New Unit	New Unit	UEENEEG00 5A	4	110	Not
UETTDRSB1 0A	Maintain HV power system static VAR compensat ors	New Unit	New Unit	UEENEEG00 5A	4	110	Not
UETTDRSB1 1A	Maintain HV power system synchronou s condensers	New Unit	New Unit	UEENEEG00 5A	4	110	Not
UETTDRSB1 2A	Maintain voltage regulating equipment – on load Tapchanger s	New Unit	New Unit	UEENEEG00 5A	4	110	Not
UETTDRSB1 3A	Install HV plant and equipment	New Unit	New Unit	UEENEEG00 5A	4	110	Not
UETTDRSB1 4A	Carry out thermovisi	New Unit	New Unit	UEENEEG00 5A	3	90	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relationsh ip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equivale nt - Full, part or not
	on surveys						
UETTDRSB1 5A	Maintain discrete protection and control systems	New Unit	New Unit	UEENEEG00 5A	4	110	Not
UETTDRSB1 6A	Commissio n discrete protection and control systems	New Unit	New Unit	UEENEEG00 5A	4	110	Not
UETTDRSB1 7A	Maintain distribution field devices	New Unit	New Unit	UEENEEG00 5A	4	110	Not
UETTDRSB1 8A	Commissio n distribution field devices	New Unit	New Unit	UEENEEG00 5A	4	110	Not

Discipline – Systems Operations

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equivale nt - Full, part or not
UETTDRSO0 2A	Manage network faults	New Unit	New Unit	UETTDRSO0 5A or UETTDRSO1 2A or	6	220	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equivale nt - Full, part or not
				UETTDRSO1 3A			
UETTDRSO0 3A	Manage critical events	New Unit	New Unit	UETTDRSO0 2A	6	220	Not
UETTDRSO0 4A	Control generating plant	New Unit	New Unit	BSBMGT507 A & UEENEED00 2A & UEENEED00 4A & UEENEED01 7A & UEENEED02 7A & UEENEED02 8A & UEENEEE00 2A & UEENEEE00 7A & UEENEEG04 9A & UEENEEH01 1A & UEENEEH01 2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRIS2 6A	6	180	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equivalen t - Full, part or not
UETTDRSO0 5A	Manage HV distribution and subtransmiss ion network demand	New Unit	New Unit	UETTDRSO1 0A	6	220	Not
UETTDRSO0 6A	Develop LV distribution switching programs	New Unit	New Unit	BSBMGT507 A & UEENEED00 2A & UEENEED00 4A & UEENEED02 7A & UEENEEE00 2A & UEENEEE00 7A & UEENEEG04 9A & UEENEEH01 1A & UEENEEH01 2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRIS2 6A	5	150	Not
UETTDRSO0 7A	Develop HV distribution and subtransmiss	New Unit	New Unit	BSBMGT507 A & UEENEED00	5	150	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equivalen t - Full, part or not
	ion switching programs			2A & UEENEE00 4A & UEENEE02 7A & UEENEE00 2A & UEENEE00 7A & UEENEE04 9A & UEENEE01 1A & UEENEE01 2A & UEENEE03 9A & UEENEE07 0A & UETTDRIS2 6A			
UETTDRSO0 8A	Develop and evaluate transmission switching programs	New Unit	New Unit	BSBMGT507 A & UEENEE00 2A & UEENEE00 4A & UEENEE02 7A & UEENEE00 2A & UEENEE00 7A & UEENEE04	5	150	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
				9A & UEENEEH01 1A & UEENEEH01 2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRIS2 6A			
UETTDRSO0 9A	Coordinate LV distribution networks	New Unit	New Unit	UETTDRSO0 6A	5	150	Not
UETTDRSO1 0A	Coordinate HV distribution and subtransmiss ion networks	New Unit	New Unit	UETTDRSO0 7A	5	150	Not
UETTDRSO1 1A	Manage transmission networks	New Unit	New Unit	BSBMGT507 A & UEENEED00 2A & UEENEED00 4A & UEENEED01 7A & UEENEED02 7A & UEENEED02 8A & UEENEEE00 2A &	6	200	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equivale nt - Full, part or not
				UEENEEE00 7A & UEENEEG04 9A & UEENEEH01 1A & UEENEEH01 2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRIS2 6A & UETTDRSO0 8A			
UETTDRSO1 2A	Manage transmission network demand	New Unit	New Unit	UETTDRSO1 1A	6	200	Not
UETTDRSO1 3A	Coordinate LV distribution network demand	New Unit	New Unit	UETTDRSO0 9A	5	150	Not
UETTDRSO1 4A	Develop crisis management plans	New Unit	New Unit	BSBMGT507 A & UEENEEED00 2A & UEENEEED00 4A & UEENEEED01 7A & UEENEEED02 7A &	6	180	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equivale nt - Full, part or not
				UEENEED02 8A & UEENEEE00 2A & UEENEEE00 7A & UEENEEG04 9A & UEENEEH01 1A & UEENEEH01 2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRIS2 6A			

Discipline – Transmission

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equivale nt - Full, part or not
UETTDRTP 02A	Establish and reinstate a transmissio n tower	New Unit	New Unit	UETTDREL 03A & UEENEEE00 1A	2	35	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
	work site						
UETDRTP 03A	Erect transmissio n towers	UTTNTD20 8A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDREL 03A & UEENEEE00 1A	2	Core	Part
UETDRTP 04A	Erect transmissio n tower hardware	UTTNTD20 8A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETDRTP0 3A	2	30	Part
UETDRTP 05A	Pre-tension stringing transmissio n overhead conductors and cables	UTTNTD21 1A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt	UETDRTP0 4A	2	35	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
			ed.				
UETTD RTP 06A	Erect transmissio n towers and associated hardware	UTTNTD20 8A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTDREL 01A & UETTDREL 02A & UETTDREL 04A & UEENEEE0 1A & UEENEEE0 2A & UEENEEG0 2A & UEENEEE0 8A	3	100	Part
UETTD RTP 07A	Maintain transmissio n towers and associated hardware	UTTNTD30 2A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTD RTP0 6A	3	100	Part
UETTD RTP 08A	Transmissio n tower stub setting	New Unit	New Unit	Nil	3	90	Not
UETTD RTP 09A	Install and maintain overhead conductors and cables	UTTNTD30 5A	Minor resembla nce to previous unit.	UETTD RTP0 7A	3	100	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
	(Towers).		Unit has been updated, realigned and reformatted.				
UETTD RTP 10A	Inspect overhead structures and electrical apparatus (Towers)	UTTNTD30 3A	Minor resemblance to previous unit. Unit has been updated, realigned and reformatted.	UETTD RTP0 7A	3	100	Part
UETTD RTP 11A	Maintain energised lines (Transmission) using live line stick technique	UTTNTD44 4A	Minor resemblance to previous unit. Unit has been updated, realigned and reformatted.	BSBFLM412 A & UETTD RIS2 5A & UETTD RTP0 9A	4	130	Part
UETTD RTP 12A	Maintain energised lines (Transmission) using	UTTNTD44 4A	Minor resemblance to previous unit.	UETTD RTP1 1A	4	130	Part

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
	Barehand Technique		Unit has been updated, realigned and reformatt ed.				
UETTD RTP 13A	Maintain energised lines (Transmissi on) using Barehand Technique on a helicopter platform	UTTNTD44 4A	Minor resembla nce to previous unit. Unit has been updated, realigned and reformatt ed.	UETTD RTP1 2A	4	130	Part
UETTD RTP 14A	Install and maintain overhead transmissio n network infrastructur e	New Unit	New Unit	UETTDREL 01A & UETTDREL 02A & UETTDREL 04A & UETTD RIS2 2A & UETTD RIS2 3A & UEENEEG00 5A	4	120	Not
UETTD RTP 15A	Install and maintain transmissio n network infrastructur	New Unit	New Unit	UETTD RTP1 4A	4	130	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighting Points	Equivalent - Full, part or not
	e electrical equipment						

Discipline – Protection/Testing

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighting Points	Equivalent - Full, part or not
UETTDRTS0 1A	Maintain network protection and control systems (Interdependent)	New Unit	New Unit	UETTDRTS0 9A	5	150	Not
UETTDRTS0 2A	Commission network protection and control systems (Interdependent)	New Unit	New Unit	UETTDRTS0 1A	5	150	Not
UETTDRTS0 3A	Conduct evaluation of power system faults within a substation	New Unit	New Unit	BSBMGT507 A & UEENEED00 2A & UEENEED00 4A & UEENEED01	6	180	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equivale nt - Full, part or not
				7A & UEENEED02 7A & UEENEED02 8A & UEENEEE00 2A & UEENEEE00 7A & UEENEEG04 9A & UEENEEH01 1A & UEENEEH01 2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRTS 6A			
UETTDRTS0 4A	Design testing and commissioni ng procedures for substation and field devices	New Unit	New Unit	UETTDRTS0 6A & UETTDRTS0 8A & UETTDRTS1 2A & UETTDRTS1 5A	6	180	Not
UETTDRTS0 5A	Test and maintain metering schemes	New Unit	New Unit	UETTDRTS0 9A	5	140	Not
UETTDRTS0 6A	Commission metering	New Unit	New Unit	UETTDRTS0 5A	5	150	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equivale nt - Full, part or not
	schemes						
UETTDRTS0 7A	Perform accuracy checks on instrument transformers	New Unit	New Unit	BSBMGT507 A & UEENEED00 2A & UEENEED00 4A & UEENEED02 7A & UEENEEE00 2A & UEENEEE00 7A & UEENEEG04 9A & UEENEEH01 1A & UEENEEH01 2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRTS2 6A	5	150	Not
UETTDRTS0 8A	Test, repair and calibrate protection relays and meters	New Unit	New Unit	BSBMGT507 A & UEENEED00 2A & UEENEED00 4A & UEENEED02	5	150	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equivalen t - Full, part or not
				7A & UEENEEE00 2A & UEENEEE00 7A & UEENEEG04 9A & UEENEEH01 1A & UEENEEH01 2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRIS2 6A			
UETTDRTS0 9A	Develop secondary isolation instructional documents	New Unit	New Unit	BSBMGT507 A & UEENEEED00 2A & UEENEEED00 4A & UEENEEED02 7A & UEENEEE00 2A & UEENEEE00 7A & UEENEEG04 9A & UEENEEH01 1A & UEENEEH01	5	150	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equivale nt - Full, part or not
				2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRIS2 6A			
UETTDRTS1 0A	Design secondary isolation instructional documents	New Unit	New Unit	BSBMGT507 A & UEENEEH00 2A & UEENEEH00 4A & UEENEEH01 7A & UEENEEH02 7A & UEENEEH02 8A & UEENEEH00 2A & UEENEEH00 7A & UEENEEH04 9A & UEENEEH01 1A & UEENEEH01 2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRIS2	6	200	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equival ent - Full, part or not
				6A			
UETTDRTS1 1A	Maintain, test and commission voltage regulating equipment	New Unit	New Unit	BSBMGT507 A & UEENEED00 2A & UEENEED00 4A & UEENEED02 7A & UEENEEE00 2A & UEENEEE00 7A & UEENEEG04 9A & UEENEEH01 1A & UEENEEH01 2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRTS2 6A	4	120	Not
UETTDRTS1 2A	Conduct evaluation of primary plant	New Unit	New Unit	BSBMGT507 A & UEENEED00 2A & UEENEED00 4A & UEENEED01 7A & UEENEED02	6	200	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equival ent - Full, part or not
				7A & UEENEED02 8A & UEENEEE00 2A & UEENEEE00 7A & UEENEEG04 9A & UEENEEH01 1A & UEENEEH01 2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRTS2 6A			
UETTDRTS1 3A	Undertake project management of substation augmentation and maintenance	New Unit	New Unit	UETTDRTS0 6A & UETTDRTS0 8A & UETTDRTS1 2A & UETTDRTS1 5A	6	220	Not
UETTDRTS1 4A	Install and maintain power system communicati on equipment	New Unit	New Unit	BSBMGT507 A & UEENEED00 2A & UEENEED00 4A & UEENEED02	5	150	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equivale nt - Full, part or not
				7A & UEENEEE00 2A & UEENEEE00 7A & UEENEEG04 9A & UEENEEH01 1A & UEENEEH01 2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRIS2 6A			
UETTDRTS1 5A	Maintain network protection and control systems (Complex)	New Unit	New Unit	BSBMGT507 A & UEENEEED00 2A & UEENEEED00 4A & UEENEEED01 7A & UEENEEED02 7A & UEENEEED02 8A & UEENEEE00 2A & UEENEEE00 7A & UEENEEG04 9A &	6	220	Not

UET06 Version 1 CSU Code	Title	UTT98 Competen cy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equival ent - Full, part or not
				UEENEEH01 1A & UEENEEH01 2A & UEENEEH03 9A & UEENEEH07 0A & UETTDRIS2 6A & UETTDRTS0 1A			
UETTDRTS1 6A	Commission network protection and control systems (complex)	New Unit	New Unit	UETTDRTS0 2A & UETTDRTS1 5A	6	220	Not

Discipline – Vegetation

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relationsh ip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Alig n.	Weighti ng Points	Equival ent - Full, part or not
UETTDRV0 1A	Cut vegetatio n above ground outside live work zone near	New Unit	New Unit	UETTDRV0 7A	2	35	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivalen t - Full, part or not
	live electrical apparatus (Climbin g)						
UETTDRCV0 2A	Operate vegetatio n control plant, machiner y and equipmen t near live electrical apparatus	New Unit	New Unit	UETTDRCV0 3A	2	Core	Not
UETTDRCV0 3A	Plan for the removal of vegetatio n up to vegetatio n exclusion zone near live electrical apparatus	New Unit	New Unit	UETTDRELO 3A & UETTDRELO 4A & UEENEEE00 1A	2	Core	Not
UETTDRCV0 4A	Assess vegetatio n and recomme nd control measures for work near live	New Unit	New Unit	UETTDRCV0 1A or UETTDRCV0 5A or UETTDRCV0 6A or UETTDRCV0 8A	2	35	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
	electrical apparatus						
UETTDRVC0 5A	Cut vegetatio n above ground outside live work zone near live electrical apparatus (Platform)	New Unit	New Unit	UETTDRVC0 7A	2	30	Not
UETTDRVC0 6A	Cut vegetatio n at ground level outside vegetatio n exclusion zone near live electrical apparatus	New Unit	New Unit	UETTDRVC0 7A	2	30	Not
UETTDRVC0 7A	Monitor safety complian ce for vegetatio n work near live electrical apparatus	New Unit	New Unit	UETTDRVC0 2A	2	Core	Not
UETTDRVC0	Safe use			UETTDRVC0	2	35	Not

UET06 Version 1 CSU Code	Title	UTT98 Competency Standard Unit Code	Relationship and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivalen t - Full, part or not
8A	of elevating work platform (EWP) near live electrical apparatus	New Unit	New Unit	7A			
UETTDRCV0 9A	Control vegetatio n (Linework)	UTTNTD31 8A	Minor resemblan ce to previous unit. Unit has been updated, realigned and reformatte d.	UETTDRCIS14 A	3	80	Part
UETTDRCV1 0A	Coordina te vegetatio n control work	UTTNTD40 6A	Minor resemblan ce to previous unit. Unit has been updated, realigned and reformatte d.	UETTDRCIS22 A & UETTDRCIS23 A	4	120	Part

Discipline – Universal Electrotechnology Units

UET06 Version 1 CSU Code	Title	UTT98 Compete ncy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
UEUNEE002A	Assemble, set-up and test personal computers	New Unit	New Unit	UEUNEE002A & UEUNEE007A	2	Core	Not
UEUNEE004A	Use engineering applications software	New Unit	New Unit	Nil	3/4	Core	Not
UEUNEE017A	Install and configure internetworking systems	New Unit	New Unit	Nil	4	Core	Not
UEUNEE027A	Develop structured programs for control sub systems to access external devices	New Unit	New Unit	Nil	3/4	Core	Not
UEUNEE028A	Develop and test basic specification for microcontroller equipped devices	New Unit	New Unit	Nil	5/6	Core	Not
UEUNEE001A	Apply OHS practices in the work place	New Unit	New Unit	Nil	1/2	Core	Not
UEUNEE002A	Dismantle, assemble and fabricate electrotechnology components	New Unit	New Unit	Nil	1/2	Core	Not

UET06 Version 1 CSU Code	Title	UTT98 Compete ncy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not

UET06 Version 1 CSU Code	Title	UTT98 Compete ncy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
UEUNEEE00 3A	Solve problems in extra-low voltage single path circuits	New Unit	New Unit	Nil	1/2	Core	Not
UEUNEEE00 4A	Solve problems in multiple path d.c. circuits	New Unit	New Unit	UEUNEEE00 3A	1/2	Core	Not
UEUNEEE00 5A	Fix and secure equipment	New Unit	New Unit	Nil	1/2/ 3	Core	Not
UEUNEEE00 7A	Use drawings, diagrams, schedules and manuals	New Unit	New Unit	Nil	2	Core	Not
UEUNEEE00 8A	Lay wiring/cabling and terminate accessories for extra-low voltage circuits	New Unit	New Unit	UEUNEEE00 2A & UEUNEEE00 5A & UEUNEEE00 7A	2	Core	Not
UEUNEEG0 01A	Solve problems in electromagnetic circuits	New Unit	New Unit	UEUNEEG0 4A	3	Core	Not
UEUNEEG0 02A	Solve problems in single and three phase low voltage circuits	New Unit	New Unit	UEUNEEG0 01A	3	Core	Not
UEUNEEG0 47A	Provide computational solutions to	New Unit	New Unit	UEUNEEG0 02A	4/5	Core	Not

UET06 Version 1 CSU Code	Title	UTT98 Compete ncy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
	power engineering problems						
UEUNEEG0 48A	Solve problems in complex multiple path power circuits	New Unit	New Unit	UEUNEEG0 47A	4/5	Core	Not
UEUNEEG0 49A	Solve problems in complex polyphase power circuits	New Unit	New Unit	UEUNEEG0 48A	5/6	Core	Not
UEUNEEH0 11A	Solve problems in d.c. power supplies with single phase input.	New Unit	New Unit	UEUNEEH0 02A & UEUNEEH0 14A	3	Core	Not
UEUNEEH0 12A	Solve problems in digital components of electronic apparatus	New Unit	New Unit	UEUNEEH0 02A or UEUNEEH0 07 0A	3	Core	Not
UEUNEEH0 39A	Solve problems in basic amplifier circuits	New Unit	New Unit	UEUNEEH0 02A or UEUNEEH0 70A & UEUNEEH0 14A or UEUNEEG00	3	Core	Not

UET06 Version 1 CSU Code	Title	UTT98 Compete ncy Standard Unit Code	Relations hip and comments to units in the former Training Package	Prerequisite requirements (for relevant pre-requisite or co-requisite refer respective unit)	AQF Align n.	Weighti ng Points	Equivale nt - Full, part or not
				2A			
UEUNEEH0 70A	Terminate and connect components, conductors, wiring and cables for electronic circuits	New Unit	New Unit	UEUNEE00 2A & UEUNEE00 7A & UEUNEE00 12A or UEUNEE00 49A	6	Core	Not

1.3.00 Assessment Guidelines

Volume 1 Part 3

Assessment Guidelines

1.3.01 Introduction

3.1 Introduction

These Assessment Guidelines provide the endorsed framework for assessment of the Competency Standard Units in this Training Package. They are designed to ensure that assessment is consistent with the Australian Quality Training Framework (AQTF 2007). Assessments against the Competency Standard Units in this Training Package must be carried out in accordance with these Assessment Guidelines.

Note:

- 1. Using this guideline to support any assessment strategy or process does not remove the responsibility of employers and employees to ensure appropriate ‘duty of care’ arrangements are maintained under relevant occupational health and safety legislation, and any other prevailing legislation, regulation, standard or code. RTOs should recognise this in their assessment processes and provide requisite advice.
- 2. In the assessment process it should be acknowledged that State/Territory regulatory requirements and/or Codes of Practice may vary. Therefore there may be a requirement for the demonstration of a greater range of items to those specified in respective Competency Standard Units. RTOs should incorporate this in their assessment processes and practices.

1.3.02 Assessment System Overview

3.2 Assessment System Overview

This section provides an overview of the requirements for assessment when using this Training Package, including a summary of the AQTF 2007 requirements; licensing/registration requirements; and assessment pathways. By way of supporting, and reinforcing, both the concept of competency and the Competency Standard Unit, the Electricity Supply Industry – Transmission, Distribution and Rail Sector embraces the following tenets:

- Wherever practicable, summative (or final) assessment is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with any approved industry and, Regulatory policy in this regard.
- All persons may claim formal recognition for an assessment of an individual Competency Standard Unit, or a group of units (Skill Sets).
- All persons have the right to have relevant competencies recognised through the most expeditious assessment system and method.

Benchmarks for Assessment

Assessment within the National Skills Framework is the process of collecting evidence and making judgements about whether competency has been achieved. Competency is something that is inferred rather than proven. The purpose of assessment is to confirm through evidence whether an individual can perform to the standards expected in the Electricity Supply Industry – Transmission, Distribution and Rail Sector workplace, as expressed in the relevant endorsed Competency Standard Unit.

In the areas of work covered by this Training Package the competency standard units are the benchmarks for assessment in the Electricity Supply Industry – Transmission, Distribution and Rail Sector. They are the basis for nationally recognised Australian Qualifications Framework (AQF) qualifications and Statements of Attainment issued by Registered Training Organisations (RTOs).

The Competency Standard Units in this Training Package include:

- National Electricity Supply Industry – Transmission, Distribution and Rail Sector (UET) Competency Standards, Edition 1, 2005 and subsequent endorsed revisions.
- Imported Competency Standard Units from other endorsed Training Packages that have been valued by the Electricity Supply Industry – Transmission, Distribution and Rail Sector Competency Advisory Council (ESI-TD&R CAC) for inclusion in Qualifications in this Training Package.

An index of the developed Competency Standard Units is contained in Volume 1 Part 2.

Australian Quality Training Framework Assessment Requirements

Assessment leading to nationally recognised AQF qualifications and Statements of Attainment in the vocational education and training sector must meet the requirement of the AQTF as expressed in the AQTF 2007 *Essential Standards for Registration*.

The AQTF 2007 *Essential Standards for Registration* can be downloaded from www.training.com.au/aqtf2007. The following points summarise assessment requirements.

Registration of Training Organisations

Assessment must be conducted by, or on behalf of, an RTO formally registered by a State or Territory Registering/Course Accrediting Body in accordance with the AQTF 2007 *Essential Standards for Registration*. The RTO must have the specific Competency Standard Units and/or AQF qualifications on its scope of registration.

The Registered Training Organisation is to be responsible for all aspects of assessment. The assessment must cover the critical aspects of evidence (assessment) detailed in each Competency Standard Unit. In addressing these critical aspects, and ensuring reasonable consistency, the assessment is to ensure that:

- the individual satisfies the requirements in terms of underpinning/essential knowledge and associated skills so that their ability to transfer the competency to differing circumstances may reasonably be inferred
- the individual is competent to safely perform all the practical applications required.

The RTO is also responsible for the issue of formal recognition in the form of National Qualifications or Statements of Attainment and where regulatory requirements apply provide additional information so required, and enter, where applicable and preferred by industry relevant information into an individual Industry Skills Passport, or other industry approved instrument. The RTO will therefore:

- issue the National Qualification based on individuals having been assessed as competent for the qualification and all the Competency Standard Units which constitute the qualification. (See Part 1 of this Training Package), **and/or**
- issue formal recognition (Statements of Attainment) in respect of individual or clusters of Competency Standard Units for which candidates have been assessed and found competent, **and/or**
- where required for regulated or industry purposes, issue additional formal information as specified by the industry and relevant regulator.

Quality Training and Assessment

Each RTO must provide quality training and assessment across all its operations. See AQTF 2007 *Essential Standards for Registration*, Standard 1.

Assessor Competency Requirements

Each person involved in training, assessment or client service must be competent for the functions they perform. See the AQTF 2007 *Essential Standards for Registration* Standard 1, for assessor (trainer) competency requirements.

Assessment Requirements

The RTOs assessments, including RPL, must meet the requirements of the relevant endorsed Training Package. See AQTF 2007 *Essential Standards for Registration* Standard 1.

Assessment Strategies

Each RTO must strategies that meet the requirements of the relevant Training Package or accredited course and are developed in consultation with industry stakeholders. See the AQTF 2007 *Essential Standards for Registration*, Standard 1.

National Recognition

Each RTO must recognise the AQF qualifications and Statements of Attainment issued by any other RTO. See the AQTF 2007 *Essential Standards for Registration, Condition of Registration 7: Recognition of qualifications issued by other RTOs*.

Registered Training Organisations may contact the EE-Oz Training Standards as the declared National Industry Skills Council for the ElectroComms and EnergyUtilities Industry, for assistance mutual recognition.

Access and Equity and Client Outcomes

Each RTO must adhere to the principles of access and equity and maximise outcomes for its clients. See AQTF 2007 *Essential Standards for Registration, Standard 2*.

Partnership Arrangements

RTOs must have, and comply with, written agreements with each organisation providing training and/or assessment on its behalf. See Standard 1.6 of the *Standards for Registered Training Organisations*.

Recording Assessment Outcomes

Each RTO must manage records to ensure their accuracy and integrity. See the AQTF 2007 *Essential Standards for Registration, Standard 3*.

Issuing AQF Qualifications and Statements of Attainment

Each RTO must issue AQF qualifications and Statements of Attainment that meet the requirements of the *AQF Implementation Handbook* and the endorsed Training Packages within the scope of its registration. An AQF qualification is issued once the full requirements for a qualification, as specified in the nationally endorsed Training Package are met. A Statement of Attainment is issued where the individual has completed one or more units of competency from nationally recognised qualification(s)/course(s). See the AQTF2007 and the 2007 edition of the AQF Implementation Handbook - available on the AQFAB website www.aqf.edu.au.

Licensing/Registration Arrangements

It is a requirement that Training Package Developers consider licensing/registration requirements in the development of the respective Industry Training Package. Generally licensing/registration requirements will be incorporated in relevant Competency Standard Units/qualifications.

Where licensing/registration applies, RTOs are to ensure that assessment against relevant Competency Standard Units is consistent with regulated requirements. Evidence of achievement should be gathered and recorded in such a way as to allow RTOs to report on such achievement that is consistent with regulated requirements.

The latest information on licensing/registration requirements may be obtained by visiting the Industry Skills Council/Training Package Developer's website. In the case of this Training Package it is EE-Oz Training Standards. Refer to the following website for more information: www.ee-oz.com.au

RTOs, are responsible for the implementation of the quality assurance arrangements included in these guidelines. However, where competency development occurs in regulated/licensed areas RTOs are to incorporate any additionally and prevailing regulatory authority requirements typically called up in these Guidelines into their quality assurance arrangements. In some instances, in order to conduct assessments for statutory licensing or other industry registration requirements, assessors must also meet any additional requirements that may also be established by the regulatory body/agency. Respective regulators should be contacted directly to obtain information in this regard.

Requirements for Assessors

In order to conduct assessment for statutory licensing or other industry registration requirements assessors must meet the requirements established by regulatory agencies and respective nominees, in addition to the AQTF requirements. Assessors are to liaise with respective agencies to ensure respective requirements are followed and met.

Requirements for RTOs

Selected Competency Standard Units and qualifications in this Training Package provide the basis for a range of statutory licensing and industry registration arrangements. To satisfy these licensing and registration arrangements, RTOs are to keep abreast of developments and any additional requirements detailed by such bodies and their respective nominees. RTOs and their assessors are therefore required to liaise with the Training Package developer and respective agencies to ensure requirements are known and met.

Requirements for Candidates

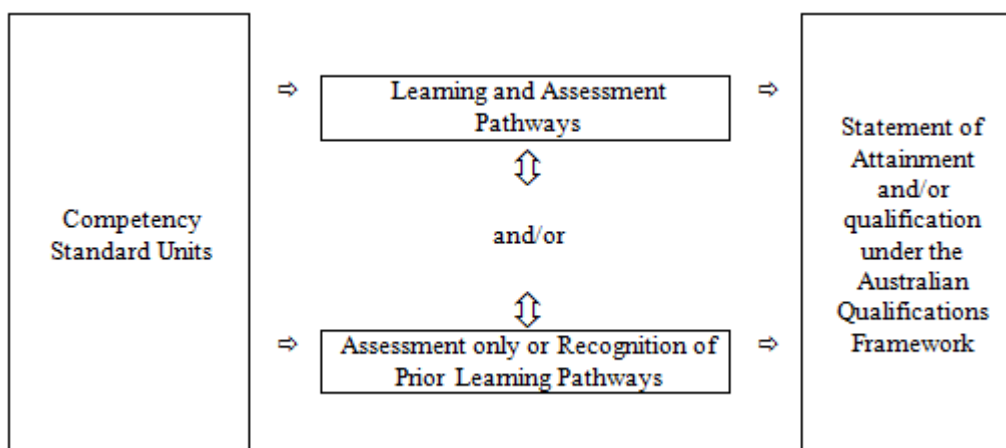
Individuals being assessed under statutory licensing and industry registration systems may be required to comply with training and experience requirements additional to any minimum requirements identified in this Training Package. These additional requirements are to be formally advised by the RTOs to individuals prior to the delivery of the Training Package outcomes.

Pathways

Competencies in Training Packages may be attained in a number of ways including through:

- formal or informal education and training
- experiences in the workplace
- general life experience, and/or
- any combination of the above.

Assessment under this Training Packages leading to an AQF qualification or Statement of Attainment may follow a learning and assessment pathway, an assessment-only or recognition pathway, or a combination of the two as illustrated below.



Each of these assessment pathways leads to full recognition of competencies held – the critical issue is that the candidate is competent, not how the competency was acquired. Assessment, by any pathway, must comply with the assessment requirements set out in the Assessment Guidelines of the Training Package and the AQTF 2007.

Learning and Assessment Pathways

Usually, learning and assessment are integrated, with assessment evidence being collected and feedback provided to the candidate at anytime throughout the learning and assessment process.

Learning and assessment pathways may include structured programs in a variety of contexts using a range of strategies to meet different learner needs. Structured learning and assessment programs could be: group-based, work-based, project-based, self-paced, action learning-based, conducted by distance or e-learning; and/or involve practice and experience in the workplace.

Learning and assessment pathways to suit Australian Apprenticeships have a mix of formal structured training and structured workplace experience with formative assessment activities through which candidates can acquire and demonstrate skills and knowledge from the relevant units of competency.

Assessment-only Pathway or Recognition of Prior Learning Pathway

Competencies already held by individuals can be formally assessed against the Competency Standard Units in this Training Package and should be recognised regardless of how, when or where they were achieved.

In an assessment-only or Recognition of Prior Learning (RPL) pathway, the candidate provides current, quality evidence of their competency. This process may be directed by the candidate and verified by the assessor, such as in the compilation of portfolios; or directed by the assessor, such as through observation of workplace performance and skills application, and oral and/or written assessment. Where the outcomes of this process indicate that the candidate is competent, structured training is not required. The RPL requirements of the AQTF 2007 must be met (Standard 1).

As with all assessment, the assessor must be confident that the evidence indicates that the candidate is currently competent against the endorsed competency standard unit(s). This evidence may take a variety of forms and might include certification, Industry Skills Council equivalence mapping declarations, references from past employers, testimonials from clients and work samples. The onus is on candidates to provide sufficient evidence to satisfy assessors that they currently hold the relevant competencies. In judging evidence, the assessor must ensure that the evidence is:

- authentic (the candidate's own work)
- valid (directly related to the current version of the relevant endorsed Competency Standard Unit)
- reliable (a range of test instruments will provide the same result for a given candidate)
- current (reflect the candidate's current capacity to perform the aspect of the work covered by the endorsed Competency Standard Unit), and
- sufficient (covers the full range of elements and performance criteria in the relevant Competency Standard Unit and addresses the four dimensions of competency, namely task skills, task management skills, con tangency management skills, and job/role environment skills).

An assessment-only or recognition of prior learning pathway is likely to be most appropriate in the following scenarios:

- candidates participating/enrolling in qualifications who want recognition for prior learning or current competencies
- existing workers
- individuals with overseas qualifications
- recent migrants with established work histories
- people returning to the workplace
- people with disabilities or injuries requiring a change in career, and
- people with existing competencies from allied industry Training Packages.

Combination of Pathways

Where candidates have gained competencies through work and life experience and gaps in their competence are identified, or where they require training in new areas, a combination of approaches may be appropriate.

In such situations, the candidate may undertake an initial assessment to determine their current competence. Once current competence is identified, a structured training and assessment program ensures that the candidate acquires the required additional competencies identified as gaps. These would be achieved through a 'training and assessment pathway'.

Assessor Requirements

This section identifies the mandatory competencies for assessors, and clarifies how others may contribute to the assessment process where one person alone does not hold all the required competencies.

Assessor Competencies

The AQTF 2007 specifies mandatory competency requirements for assessors. For information, Standard 1, Element 1.4 from the AQTF 2007 *Essential Standards for Registration* follows:

"1.4 Training and assessment is delivered by trainers and assessors who:

- a) have the necessary training and assessment competencies as determined by the National Quality Council or its successors*
- b) have the relevant vocational competencies at least to the level being delivered or assessed*

continue developing their vocational and training and assessment competencies to support continuous improvements in the delivery of the RTO's services."

7.3 a The RTO must ensure that assessments are conducted by a person who has:

i the following competencies¹ from the Training Package for Assessment and Workplace Training, or demonstrated equivalent competencies:

- a TAAASS401A Plan and organise assessment;
- b TAAASS402A Assess competence;
- c TAAASS404A Participate in assessment validation;

ii relevant vocational competencies, at least to the level being assessed.

b However, if a person does not have all of the competencies in Standards 7.3 a (i) and the vocational competencies as defined in 7.3 a (ii), one person with the competencies listed in Standard 7.3 a (i), and one or more persons who have the competencies listed in Standard 7.3 a (ii) may work together to conduct assessments.

Designing Assessment Tools

This section provides an overview on the use and development of assessment tools.

Use of Assessment Tools

Assessment tools provide a means of collecting the evidence that assessors use in making judgements about whether candidates have achieved competency.

There is no set format or process for the design, production or development of assessment tools. Assessors may use prepared assessment tools, such as those specifically developed to support this Training Package, or they may develop their own.

Using Prepared Assessment Tools

If using prepared assessment tools, assessors should ensure that these tools are benchmarked or mapped against the current version of the relevant competency standard unit(s) and any industry-preferred model, and supported by the industry. This can be done by checking that the materials are listed on the National Training Information Service (<http://www.ntis.gov.au>) or EE-Oz Training Standards (www.ee-oz.com.au). Materials on the list have been noted by the National Quality Council (NQC), as meeting the quality criteria for Training Packages support materials.

Developing Assessment Tools

When developing assessment tools, assessors must ensure that they:

- are benchmarked against the relevant competency standard unit(s)
- are benchmarked against the industry-preferred competency assessment model
- are reviewed as part of the continuous improvement of assessment strategies as required under Standard 1 of the AQTF 2007.
- meet the assessment requirements expressed in Standard 1 of the AQTF 2007.

A key reference for assessors developing assessment tools is TAA04 Training and Assessment Training Package and the unit of competency TAAASS403A *Develop assessment tools*. There is no set format or process for the design, production or development of assessment materials.

Conducting Assessment

This section details the mandatory assessment requirements and provides information on equity in assessment including reasonable adjustment.

Mandatory Assessment Requirements

Assessments must meet the criteria set out in the AQTF 2007 Essential Standards for Registration.

For information, the mandatory assessment requirements from Standard 1 from the AQTF 2007 *Essential Standards for Registration* are as follows:

- "1.
5 *Assessment, including Recognition of Prior Learning:*
- a) *meets the requirements of the relevant Training Package or accredited course,*
 - b) *is conducted in accordance with the principles of assessment and the rules of evidence, and*
 - c) *meets workplace and, where relevant, regulatory requirements."*

8. RTO Assessments

The RTO's assessments meet the requirements of the endorsed components of Training Packages and the outcomes specified in accredited courses within the scope of its registration.

8.1. The RTO must ensure that assessments (including RPL):

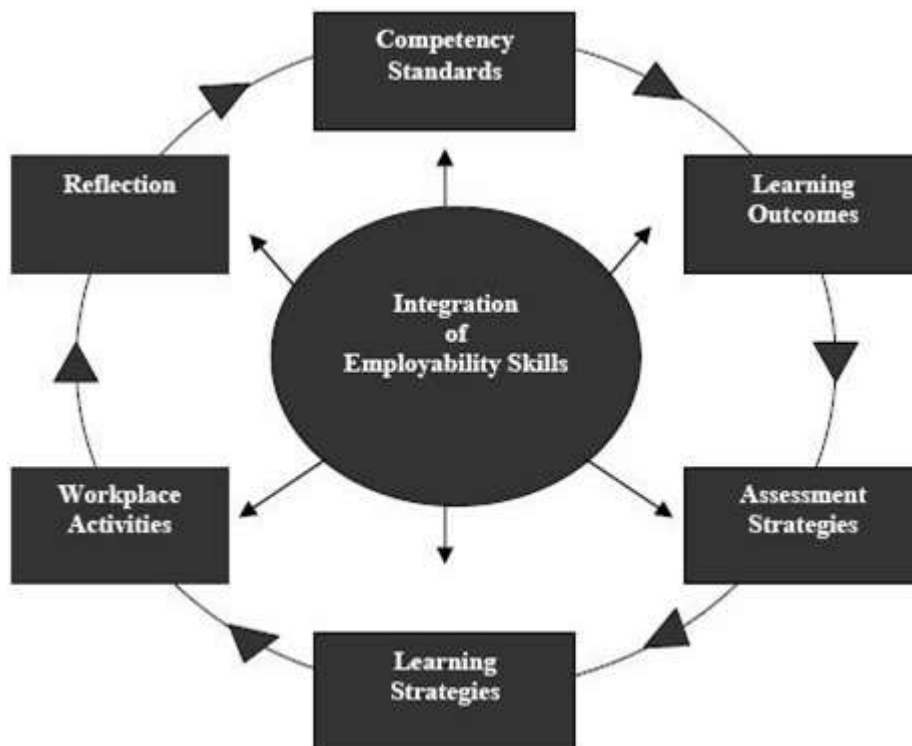
- i. comply with the assessment guidelines included in the applicable nationally endorsed Training Packages or the assessment requirements specified in accredited courses;
- ii. lead to the issuing of a statement of attainment or qualification under the AQF when a person is assessed as competent against nationally endorsed unit(s) of competency in the applicable Training Package or modules specified in the applicable accredited course;
- iii. are valid, reliable, fair and flexible;
- iv. provide for applicants to be informed of the context and purpose of the assessment and the assessment process;
- v. where relevant, focus on the application of knowledge and skill to the standard of performance required in the workplace and cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills;
- vi. involve the evaluation of sufficient evidence to enable judgements to be made about whether competency has been attained;
- vii. provide for feedback to the applicant about the outcomes of the assessment process and guidance on future options in relation to those outcomes;
- viii. are equitable for all persons, taking account of individual needs relevant to the assessment; and
- ix. provide for reassessment on appeal.

8.2. a The RTO must ensure RPL is offered to all applicants on enrolment.**b The RTO must have an RPL process that:**

- i. is structured to minimise the time and cost to applicants; and
- ii. provides adequate information, support and opportunities for participants to engage in the RPL process.

Assessment of Employability Skills

Employability Skills are integral to workplace competency. As such they must be considered in the design, customisation, delivery and assessment of vocational education and training programs in an integrated and holistic way, as represented diagrammatically below.



Employability Skills are embedded and explicit within each unit of competency. Training providers must use Employability Skills information in order to design valid and reliable training and assessment strategies. This analysis could include:

- reviewing units of competency to locate relevant Employability Skills and determine how they are applied within the unit
- analysing the Employability Skills Summary for the qualification in which the unit or units are packaged to help clarify relevant industry and workplace contexts and the application of Employability Skills at that qualification outcome
- designing training and assessment to address Employability Skills requirements.

For more information on Employability Skills in the ElectroComms and Energy Utilities Training Packages go to the EE-Oz website at www.ee-oz.com.au

Access and Equity

An individual's access to the assessment process should not be adversely affected by restrictions placed on the location or context of assessment beyond the requirements specified in this Training Package: training and assessment must be bias-free.

Under the rules for their development, Training Packages must reflect and cater for the increasing diversity of Australia's VET clients and Australia's current and future workforce. The flexibilities offered by Training Packages should enhance opportunities and potential outcomes for all people so that we can all benefit from a wider national skills base and a shared contribution to Australia's economic development and social and cultural life.

Reasonable Adjustments

It is important that education providers take meaningful, transparent and reasonable steps to consult, consider and implement reasonable adjustments for students with disability.

Under the *Disability Standards for Education 2005*, education providers must make reasonable adjustments for people with disability to the maximum extent that those adjustments do not cause that provider unjustifiable hardship. While 'reasonable adjustment' and 'unjustifiable hardship' are different concepts and involve different considerations, they both seek to strike a balance between the interests of education providers and the interests of students with and without disability.

An adjustment is any measure or action that a student requires because of their disability, and which has the effect of assisting the student to access and participate in education and training on the same basis as students without a disability. An adjustment is reasonable if it achieves this purpose while taking into account factors such as the nature of the student's disability, the views of the student, the potential effect of the adjustment on the student and others who might be affected, and the costs and benefits of making the adjustment.

An education provider is also entitled to maintain the academic integrity of a course or program and to consider the requirements or components that are inherent or essential to its nature when assessing whether an adjustment is reasonable. There may be more than one adjustment that is reasonable in a given set of circumstances; education providers are required to make adjustments that are reasonable and that do not cause them unjustifiable hardship. See Part 4, Chapter 2 of the *Training Package Development Handbook* (DEST, September 2007) for more information on reasonable adjustment, including examples of adjustments.

3.12 Further Sources of Information

The section provides a listing of useful contacts and resources to assist assessors in planning, designing, conducting and reviewing of assessments against this Training Package.

Contacts:

Unit 2, 48 Mort Street
Braddon, ACT, 2612
PO Box 1202
Dickson, ACT, 2602
Ph: 02 6241 2155
Fax: 02 6241 2177
Email: ee-oz@ee-oz.com.au
Web: www.ee-oz.com.au

Technical and Vocational Education and Training (TVET) Australia Limited
Level 21, 390 St Kilda Road, Melbourne VIC 3150
PO Box 12211, A'Beckett Street Post Office
MELBOURNE VICTORIA 8006
Ph: +61 3 9832 8100
Fax: +61 3 9832 8198
Email: sales@tvetaustralia.com.au
Web: www.tvetaustralia.com.au

For information on the TAA04 Training and Assessment Training Package contact:

Innovation & Business Skills Australia
Level 11, 176 Wellington Pde
EAST MELBOURNE VIC 3002
Telephone: (03) 9815 7000
Facsimile: (03) 9815 7001
Web: www.ibsa.org.au
Email: reception@ibsa.org.au

General Resources

Refer to <http://antapubs.dest.gov.au/publications/search.asp> to locate the following publications.

AQF Implementation Handbook, third Edition. Australian Qualifications Framework Advisory Board, 2010, www.aqf.edu.au

Australian Quality Training Framework 2007 (AQTF 2010) - for information and resources go to <www.training.com.au/aqtf2010>

AQTF 2010 Essential Standards for Registration. Training organisations must meet these standards in order to deliver and assess nationally recognised training and issue nationally recognised qualifications. They include three standards, a requirement for registered training organisations to gather information on their performance against three quality indicators, and nine conditions of registration

AQTF 2010 User's Guide to the Essential Standards for Registration. A Users' Guide for training organisations who must meet these standards in order to deliver and assess nationally recognised training and issue nationally recognised qualifications.

AQTF 2010 Standards for Accredited Courses. State and Territory accrediting bodies are responsible for accrediting courses. This standard provides a national operating framework and template for the accreditation of courses.

TAE10 Training and Assessment Training Package. This is available from the Innovation and Innovation & Business Skills Australia (IBSA) Industry Skills Council and can be viewed, and components downloaded, from Training.gov.au (TGA).

Training.gov.au, an electronic database providing comprehensive information about RTOs, Training Packages and accredited courses - www.tga.gov.au

Training Package Development Handbook (DEEWR, 2010). Can be downloaded from www.deewr.gov.au

Assessment Resources

Training Package Assessment Guides - is a range of resources to assist RTOs in developing Training Package assessment materials developed by ANTA/DEEWR with funding from the DEEWR (formerly Department of Education, Science and Training), made up of 10 separate titles, as described at www.deewr.gov.au/project/tpAssessment/. Go to www.resourcegenerator.gov.au/loadpage.asp?TPOAG.htm

Printed and/or CD ROM versions of the Guides can be purchased from Australian Training Products (ATP). The resource includes the following guides:

1. Training Package Assessment Materials Kit
2. Assessing Competencies in Higher Qualifications
3. Recognition Resource
4. Kit to Support Assessor Training
5. Candidate's Kit: Guide to Assessment in Australian Apprenticeships
6. Assessment Approaches for Small Workplaces
7. Assessment Using Partnership Arrangements
8. Strategies for ensuring Consistency in Assessment
9. Networking for Assessors
10. Quality Assurance Guide for Assessment

An additional guide "Delivery and Assessment Strategies" has been developed to complement these resources.

Assessment Tool Design and Conducting Assessment

VETASSESS & Western Australian Department of Training and Employment 2000, *Designing Tests – Guidelines for designing knowledge based tests for Training Packages*. Vocational Education and Assessment Centre 1997, *Designing Workplace Assessment Tools, A self-directed learning program*, NSW TAFE.

Manufacturing Learning Australia 2000, *Assessment Solutions*, Australian Training Products, Melbourne.

Rumsey, David 1994, *Assessment practical guide*, Australian Government Publishing Service, Canberra.

Assessor Training

Australian Committee on Training Curriculum (ACTRAC), 1994, Assessor training program - learning materials, Australian Training products, Melbourne.

Australian National Training Authority, A Guide for Professional Development, ANTA, Brisbane or its replacement – contact DEEWR for more information on www.deewr.gov.au

Australian National Training Authority, Facilitator Packs for Certificate IV in Training and Assessment or its replacement – contact DEEWR for more information on www.deewr.gov.au

Australian National Training Authority, Facilitator's Pack for Train Small Groups and Assessment or its replacement – contact DEEWR for more information on www.deewr.gov.au

Australian Training Products Ltd *Assessment and Workplace Training, Training Package - Toolbox*, ATPL Melbourne (available from TVET).

Green, M., Moritz, R., Moyle, K. and Vale, K., 1997, *Key competencies professional development Package*, Department for Education and Children's Services, South Australia.

Victorian TAFE Association, 2000, *The professional development CD: A learning tool*, VTA, Melbourne.

1.3.03 ESI - Transmission, Distribution & Rail, Learning and Assessment pathways

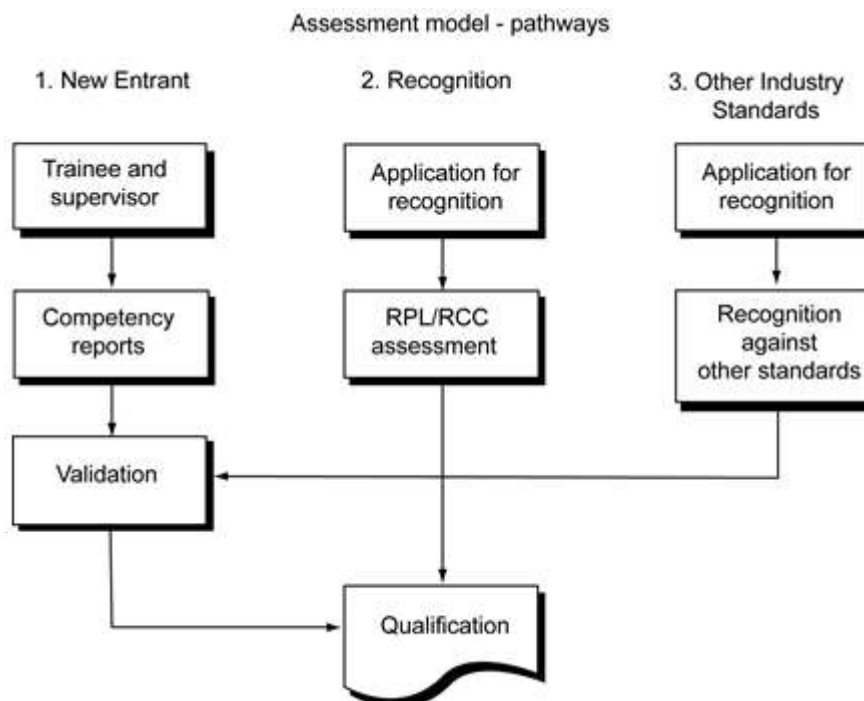
3.3 ESI – Transmission, Distribution & Rail, Learning and Assessment pathways

Within the general Training Package Pathways continuum framework, referred to in the previous section, three distinct Assessment Pathways have been identified for use within the Electricity Supply Industry – Transmission, Distribution and Rail Sector. Although not exclusive, the three pathways provide typical recognition processes for individual Competency Standard Units or groups of units that make up Qualifications or Statements of Attainment. From an industry perspective, assessment is to lead to formal recognition of the Industry’s benchmark competencies or formal recognition of competencies from other industries. Formal recognition may be for individual competencies or for groups of competencies, which may be combined to satisfy the requirements of a National Qualification.

Pathway 1: New entrant competency development

Pathway 2: Recognition of currently held competencies or prior learning and workplace experience

Pathway 3: Recognition of other currently held competencies (other industry standards)



Pathway 1: New Entrant Competency Development

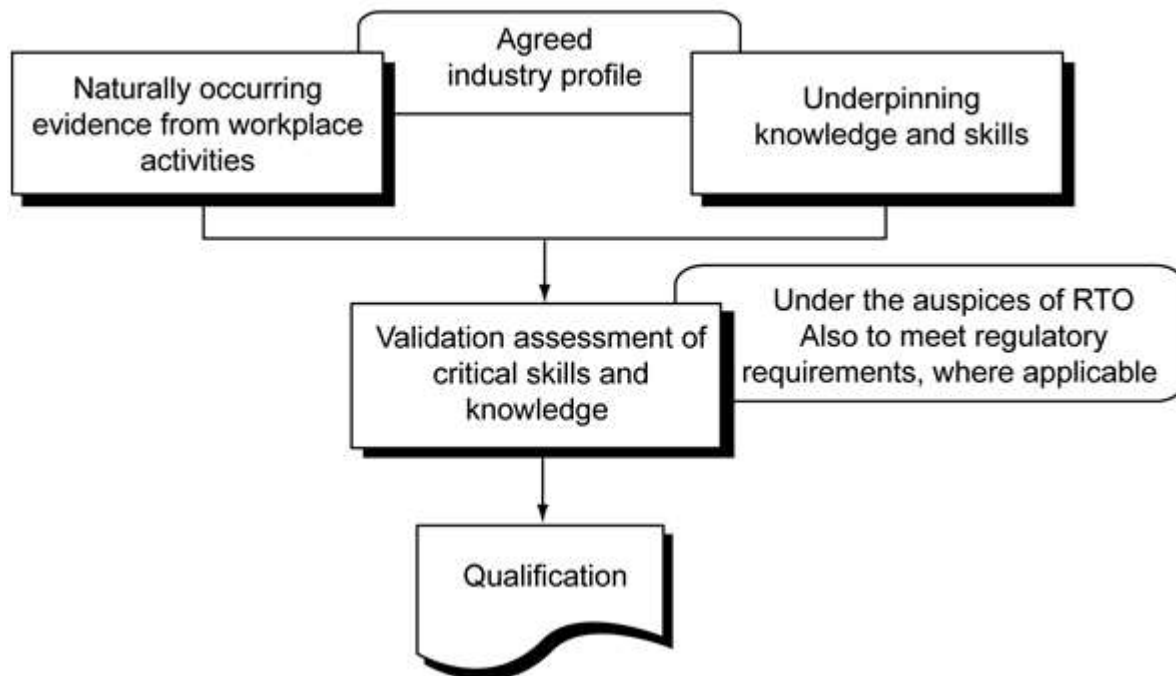
This pathway is for individuals who are undertaking an industry preferred competency development plan. The users of this pathway may be:

- contracted employment based employees who are generally new apprentices and who undertake an approved training program that supports a competency development plan, **or**
- those that undertake an approved structured training program in an institutional environment to achieve competency outcomes.

Evidence of Competency

In this pathway evidence required to determine competence for the issuance of the qualification or Statement of Attainment is to be in accordance with **3.4 Assessment principles within the Electricity Supply Industry – Transmission, Distribution and Rail Sector** contained herein. The evidence however, must be sufficient in quality, quantity and type and be gathered in an on-going basis in a timely and accurate manner from several sources, such as, workplace and educational experiences based on the approved industry training program and related competency development plan in which individuals are involved.

Pathway 1. Evidence of competency (New entrant)



Pathway 2: Recognition of prior learning/current competencies (RPL/RCC)

This pathway is for those who may have acquired skills and knowledge in relevant Competency Standard Units outside formally recognised processes. The users of this pathway will include applicants from overseas and also applicants who have developed skills in allied industries but who have no formal recognition in respect of industry standards or qualifications. In using this pathway RTOs should also identify if any equivalence mapping document exists as per Pathway 3.

Additionally, an existing national mechanism for the recognition as a tradesperson is through the Tradesmen's Rights Regulation Act, which is administered by Trades Recognition Australia (TRA), which is part of the Commonwealth Department of Industrial Relations. TRA grants recognition for the purposes of migration but further analysis of the applicant's knowledge and skills is often needed before competency can be attributed.

The Trades Recognition Australia process mainly operates to provide formal recognition of the knowledge and skills of migrants, which have been developed by structured training and or work experience in overseas countries. However, it is also an important mechanism for the assessment and recognition of the competencies of people who may not have had access to the industry preferred new entrant model of competency development for trade vocations in Australia. For more information visit:

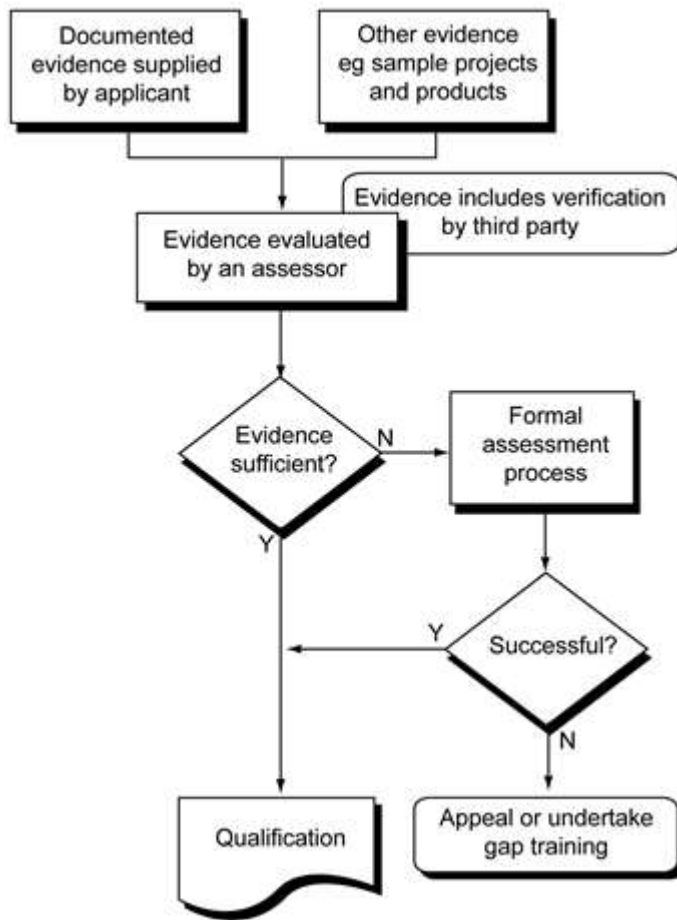
<http://www.workplace.gov.au/workplace/Category/SchemesInitiatives/TRA/TRA-TradeClassificationsAssessed.htm>

Evidence of Competency

In Pathway 2 many types of evidence can be used to determine competency for the issuance of qualifications or Statements of Attainment. The evidence may come from records of previous relevant work experience. This type of evidence will need endorsement by a supervisor/mentor skilled in the units for which recognition is sought. Evidence may consist of portfolios such as projects or products completed for other purposes, or from non-registered training programs or ad hoc prior experience, or from overseas programs of a similar nature.

Industry would expect this evidence to be assessed by the RTO (or its nominee – a qualified industry assessor). The result will be that the applicant is judged competent for the competency standard unit(s) or gaps are identified and noted. Where a gap is identified, the applicant can either accept the judgement and pursue gap training or elect to appeal the decision. Evidence used in the appeal process may include a personal portfolio, relevant work history, interview, comments by peers or employers, and challenge tests.

Pathway 2. Recognition (RPL/RCC)



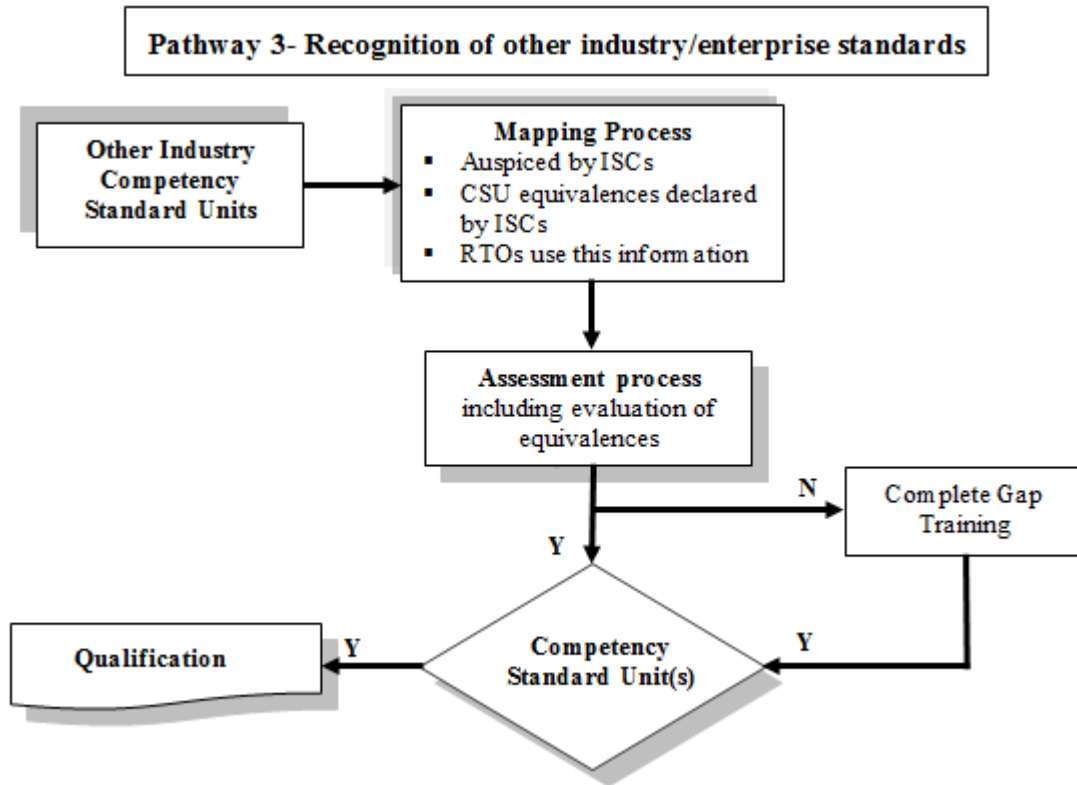
Pathway 3: Recognition of Other Industry/Enterprise Standards

This pathway is for individuals who have developed skills based on other nationally recognised industry or enterprise competency standards and who have received formal recognition in Competency Standards Unit(s) from these areas. Recognition of equivalence of Competency Standard Units between industries is through an agreed and formal mapping process. Equivalence of outcomes are declared by Industry Skills Councils for respective Training Packages. The recognition of Units, as part of any mapping arrangements is the responsibility of the parties who maintain the competency standards, in this instance EE-Oz Training Standards. RTOs should investigate whether any mapping agreements are in place by contacting the relevant Industry Skills Councils.

Evidence of Competency

In this pathway, evidence will be based on formally agreed mapping declaration(s) of Competency Standards Unit(s) of other Industry Competency Standards against the unit(s) in the Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package for which formal recognition is sought. The equivalence mapping declaration agreement would be formalised between Industry Skills Councils.

The applicant would be required to supply details of the unit(s) held including any currency, and the unit(s) sought in consultation with the RTO, including submitting any assessment reports to the RTO for a determination. This equivalence evidence will be reviewed against the mapping advice obtained by the RTO (or their nominee) and a judgement made. The result will be either that the applicant is deemed competent for the unit(s) and a Statement of Attainment issued, or gaps are identified, advised and noted. Where a gap has been identified the applicant can consider the judgement, pursue gap training or appeal the decision. Evidence used in the judgement process is based on the individual's records of achievement relative to the Competency Standard Units for which recognition is sought.



1.3.04 Assessment Principles within the Electricity Supply Industry - Transmission, Distribution and Rail Sector

3.4 Assessment Principles within the Electricity Supply Industry – Transmission, Distribution and Rail Sector

These assessment practices must satisfy the principles of assessment:

Assessment Principles

Validity

The assessment instruments and tasks must be designed, implemented and administered in a manner which ensures they measure the intended the essential knowledge and associated skills with workplace performance requirement, and the evidence gathered relates directly to the Competency Standard Unit(s) being assessed.

Validity includes the need to involve others with expertise in the assessments being implemented in the development, selection and review of the instruments and methods used in the assessment process.

To be valid the assessment judgements need to be based on more than one task with evidence gathered on a number of occasions and in a variety of contexts or situations.

Reliability

Assessment practices should be in accord with *AQTF Standard 9.2* and undergo constant monitoring and review to ensure consistency in the application of process and interpretation of evidence.

RTOs will ensure clear guidelines are available to Assessors to ensure consistent judgements are made based on the evidence provided. Where industry and/or regulatory endorsed training support materials are available, it is recommended that this material is used to support and increase the reliability of assessment. This approach will assist in establishing and maintaining consistency of performance of the essential knowledge and skills and work performance requirements specified in the Competency Standard Units.

Flexibility

The assessment approach should be developed to meet the needs of potential candidates and where appropriate negotiated between the candidate and assessor.

Assessments are to cover both the skill and knowledge components of competency as described in the Competency Standard Units without any one-assessment method being prescribed.

A range of assessment instruments and items should be made available, and where appropriate, the time and place of assessment should be determined to suit the availability of resources, assessors and candidates. However, where supported by the Industry for the purposes of enhancing consistency, the preferred assessment arrangements should be adopted and used.

Fairness

Assessment methods and practices shall be equitable to all individuals.

Candidates will be made aware of the assessment methods and procedures together with details of the criteria against which they are to be assessed.

Specific needs of individual candidates will be accommodated as is practicable and reasonable adjustment is made while maintaining the integrity of the assessment outcomes based on the Competency Standard Unit(s) being assessed.

Currency

The principle to be applied in the Electricity Supply Industry – Transmission, Distribution and Rail Sector for currency of evidence is that claims are to be fully substantiated through both direct and supporting assessment processes.

Assessment processes must satisfy the requirement for currency in terms of:

1. technology and/or processes
2. recency of application

Regulatory/Context of Assessment

Competency is to be determined on evidence of having consistently performed across a representative range of specified equipment, processes and activities for the scope of work and/or endorsement for which competency is being sought; autonomously and to requirements. Equivalent evidence from other sources, e.g., formal assessment, is also acceptable.

With respect to the essential knowledge and associated skills component of each competency standard unit, assessment activities shall be in accordance with the approach required by the regulatory environment. This may include the use of industry-supported essential knowledge and associated skills learning specifications structured in a conducive learning environment to facilitate the development of depth and breadth of learning, aid in retention and enhance transferability. For this component where graded assessment is a regulatory requirement, it will apply to the underpinning knowledge off-the-job component and not the competency standard unit as a whole. The Industry preference is for a percentile based graded assessment system to be used. Also, although it is preferred that assessing competency be carried out in the workplace, it can be undertaken in a simulated work environment approved for that purpose by the industry. Refer to any Industry policy that may apply in this regard.

Assessment Judgments

Attributing Competency

The deeming of competency shall be based on evidence that is sufficient, current and authentic, so that a quality low risk judgment can be made based on the assessment principles outlined herein.

Competencies shall be attributed on evidence showing that the person deemed to be competent is able to undertake the responsibilities for all safety measures, care of technology, plant and equipment, use of standards, manuals and procedures, and care of the environment, directly related to the work function for which such competencies are required.

Note:

1. Where the consequences of unjustifiably or mistakenly deeming a person competent carries a risk of injury to persons, commerce, or damage to property and/or the environment, the level of evidence required for sufficiency is higher than where there is little risk. The risk of attributing competence to an individual should, therefore, form a critical part of the assessment process and methodology. Consideration should be given as to whether all pre-requisites and/or co requisites have been appropriately achieved.

2. The decision to attribute competence differs from training effort and delivery. The decision to attribute competence is based on evidence being present for an assessor to attribute such and not a person in learning. Learners, however, can undertake training in Competency Standard Units without being awarded the Competency Standard Units even when they may not have acquired in the required sequence any of the pre-requisite Competency Standard Units. However, they cannot be attributed the Competency Standard Unit until they have acquired the pre-requisite.

3. For more detailed information refer to Section 3.9 Guide to Assessment Methods and Items.

Sufficiency of Evidence

In all instances competence is to be attributed on evidence sufficient to show that a person has the necessary skills required for the scope of work. This includes:

- **Task skills — performing individual tasks**
- **Task management skills** — managing a number of different tasks
- **Contingency management skills** — responding to irregularities and breakdowns in routines
- **Job/role environment skills** — dealing with the responsibilities and expectations of the work environment including working with others.

Evidence must demonstrate that an individual can perform competently across the specified range of activities and has the essential knowledge, understanding and associated skills underpinning competency.

Currency of Evidence

Evidence must be relevant to what is outlined in Competency Standard Units and not outdated or irrelevant.

Note: The deeming of competence at a point in time does not mean that competence exists for all time; competency must be maintained by use and/or retraining. Also refer to Section 3.9 Guide to Assessment Methods and Items for more detailed information on currency.

If there has been a recent change in technology, then evidence of actions before such change is unlikely to reflect the required currency. Similarly, if the individual claiming competency has not performed/applied that competency for extensive periods of time then documentary evidence would not suffice as a basis of assessment.

Authenticity

Evidence is to be genuine and relate to the person being assessed, and no one else.

- By way of supporting and reinforcing both the concept of competency and the Competency Standard Units as the currency for the Vocational Education **and** Training (VET) system, the Electricity Supply Industry – Transmission, Distribution and Rail Sector embraces the following tenets:
- Assessment (summative or final) is to include the application of the competency in the normal work environment, or at a minimum, the application of the competency in a realistically simulated work environment.

- Simulation must be in accord with any prevailing Industry policy. It is recognised that in some circumstances, assessment may occur outside the workplace, however this should only occur where necessary and in accord with any Industry policy. In relation to this Training Package the Industry Skills Council for ElectroComms and EnergyUtilities, EE-Oz Training Standards, has developed an industry Simulation Policy. This can be accessed from the EE-Oz Training Standards website at: www.ee-oz.com.au.
- All **persons** may claim formal recognition for an assessment of an individual Competency Standard Unit or a group of units.
- All **persons** have the right to have relevant competencies recognised through the most expeditious assessment system and method.
- Under-**represented** groups are not biased from participation and access.

1.3.05 Assessment Processes

3.5 Assessment Processes

Within the Electricity Supply Industry – Transmission, Distribution and Rail Sector **sampling, profiling** and **portfolio** are recognised as the three main methods of collecting evidence to assist the assessment processes and, while they are not mandatory, they have become accepted and the preferred industry practice. It is not the purpose of these Guidelines to provide an extensive technical description of each of these methods; however, it is important to recognise the impact each will have on the management of assessment practices. Profiling, however, is the Industry-preferred model for new entrant contracted entry-level employment, e.g. apprenticeships. Therefore, an overview of each is provided in this Guideline along with sample templates to assist Registered Training Organisations (RTOs) in planning, managing and administering training and assessment delivery.

1. Sampling

Sampling requires evidence of competence to be derived from a limited sample of performance event(s). Technical/application skills are normally assessed by practical measures, and knowledge underpinning performance is assessed, typically in conducive learning environments like classrooms, by conventional written or oral questioning.

2. Profiling

Profiling requires the progressive collection of many samples through structured documentation and progress summative reporting. Progressive monitoring of direct and possibly indirect evidence, over an extended period of time is used to assist in intervention and, making judgements about the developing competency profile of the candidate/learner. The focus of evidence collection is set against the Elements; Range Statement; and critical aspects detailed in the competency standard units and complemented with the level of supervision applied. The evidence collection process is staged against known and predefined work performance outcomes as specified in the Competency standard units. Profiling will assist in obtaining a series of periodical audit assessments and/or a final holistic assessment event where regulatory/licensing requirements apply. Profiling is the preferred industry model that assists with assessment for entry-level contracted employment. Technical educational achievements may be incorporated in the Profiling Model or augment information gathered directly from the workplace into the profile. In the latter case it is preferred that a final summative and holistic assessment event be applied prior to the issuance of the qualification or relevant Statement of Attainment.

3. Portfolio

The Portfolio approach is best suited to assessment conducted as Recognition of Prior Learning (RPL) and is to be in accord with AQTF Standard 8.2 or its replacement/equivalent. It requires the collection or build-up of indirect evidence as to an individual's competence. The Portfolio of evidence could include Statements of Attainment issued by other RTOs (Mutual Recognition AQTF Standard 5), suitably focused references and testimonials, formal project appraisals, work records and any other evidence which is current and relevant to the competencies sought.

Opportunities for Combined Approaches

The assessment processes described above are not mutually exclusive and a combination of approaches may be implemented. The process selected will be acceptable to the industry if the outcome is valid, the approach supports industry-wide consistency, the requirements of the Competency Standard Units are satisfied and in accordance with the preferred industry approach and costs are acceptable to the industry.

Assessors, Technical Experts and Workplace Supervisors

Single assessor – Single arrangement

Where an individual assessor conducts the assessment the assessor is required to:

- hold formal recognition of competence in the relevant units in the Training Package for Training and Assessment
- be deemed competent and, where possible, hold formal recognition of competence in the specific Competency Standard Units in this Training Package, at least to the level being assessed.

In addition, it is recommended by the Industry that the assessor can:

- demonstrate current knowledge of the Electricity Supply Industry – Transmission, Distribution and Rail Sector, industry practices, and the job or role against which performance is being assessed;
- demonstrate current knowledge and skill in assessing against this Training Package which contains the vocational standards for industry in a range of contexts.
- demonstrate the necessary interpersonal and communication skills required in the assessment process.
- continue to meet the requirements of the industry;
- ensure assessment is consistent with the Australian Quality Training Framework Standards for Registered Training Organisations;
- promote confidence in the system and the assessment outcomes on the part of industry, employers, enterprises, unions, employees, trainees, assessors and trainers;
- ensure assessment processes and outcomes are valid, reliable, fair and flexible;
- support RTOs in effectively carrying out their responsibilities.
- participate in professional development;
- have relevant work experience;
- participate in professional/industry networks and assessor programs;
- have recent planning and review of assessment activities;
- participate in assessment validation processes;
- have recent assessment and/or workplace training activities.

Partnership Arrangement

Option 1 – Working with a Technical Expert

An assessor works with a technical expert to conduct the assessment. The Assessor is required to hold formal recognition of competence in the relevant units in the Training Package for Training and Assessment.

In addition, it is recommended that the assessor is able to:

- demonstrate current knowledge and skill in assessing against this Training Package which contains the vocational standards for industry in a range of contexts;

- demonstrate capability to assess with a technical expert;
- demonstrate the interpersonal and communications skills required in the assessment process.

A technical expert is one that is required to be deemed currently competent and, where possible, hold formal recognition of competence in the specific Competency Standard Units from this Training Package which contains the vocational standards for industry, at least to the level being assessed.

In addition, it is recommended that the Technical Expert is able to:

- demonstrate current knowledge of the industry, industry practices, and the job or role against which performance is being assessed;
- communicate and liaise with the assessor throughout the assessment process.

Option 2 – Working with a Workplace Supervisor

An assessor works with workplace supervisor in collecting evidence for valid assessment.

An assessor is required to:

- hold formal recognition of competence in training and assessment in the relevant units in the Training and Assessment Training Package
- make the assessment decision.

In addition, it is recommended that the assessor is able to:

- demonstrate current knowledge and skill in assessing against this Training Package in a range of contexts
- demonstrate a capability to assess using a Workplace Supervisor as a valid and reliable source of evidence collaboration
- demonstrate the interpersonal and communication skills required in the assessment process
- communicate and liaise, where appropriate, with the workplace supervisor throughout the assessment process.

A workplace supervisor is required to be deemed currently competent and, where possible, is to hold formal recognition of competence in the specific Competency Standard Units from this Training Package at least to the level being assessed.

In addition, it is recommended that the Workplace supervisor is able to:

- demonstrate current knowledge of the industry, industry practices, and the job or role against which performance is being assessed
- communicate and liaise, where appropriate, with the assessor throughout the assessment process
- use agreed practices to gather and record evidence for the assessor to use in making a valid judgement on competency.

Assessment Team/Panel

A team working together to conduct the assessment

Members of an assessment team or panel that comprises assessment and industry experience and expertise works together in the collection of evidence and in making judgements about competency. The members of the team must include at least one person who:

- holds formal recognition of competence in training and assessment in the relevant units in the Training and Assessment Training Package
- is deemed competent and, where possible, holds formal recognition of competence in the specific Competency Standard Units from this Training Package at least to the level being assessed, and where not technically competent use team/panel members with current technical competence in requisite units;

In addition, it is recommended that members of the team/panel involved in the assessment are able to:

- at least one member be currently competent in the specific competency standards units under assessment
- demonstrate current knowledge of the industry, industry practices, and the job or role against which performance is being assessed
- demonstrate current knowledge and skill in assessing against this Training Package in a range of contexts
- demonstrate the interpersonal and communication skills required in the assessment process and liaise with other team/panel members throughout the assessment process.

Assessments against the competencies in the Training Package will be carried out in accordance with these endorsed guidelines. The guidelines include the necessary qualifications for those conducting assessments and provide for those situations where more than one person may contribute to the assessment and where the required technical and assessment competencies may not be held by any one person.

1.3.07 Assessment Tools

3.7 Assessment Tools

This section provides an overview of assessment tools and their suggested use in the industry.

Use of Assessment Tools

Assessment resources provide a means of collecting the evidence that assessors use in making judgements about whether candidates have achieved competency.

In some cases, assessors may use prepared assessment materials, such as those specifically developed to support this Training Package - Training and Assessment Advice Manual for the Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package UET06, available from EE-Oz Training Standards. Visit the website: (www.ee-oz.com.au). Alternatively they may develop their own assessment materials to meet the needs of their clients by utilising pre-developed training and assessment instruments included in Section 3.8 Electricity Supply Industry – Transmission, Distribution and Rail Sector Guidelines for designing assessment materials.

Using Prepared Assessment Tools

If using prepared assessment materials, assessors should ensure that the materials are benchmarked, or mapped, against the current version of the relevant Competency Standard Unit(s) and any industry preferred model and supported by the industry. This can be done by checking that the materials are listed on the National Training Information Service (<http://www.ntis.gov.au>) or EE-Oz Training Standards (www.ee-oz.com.au). Specific materials on the list have been noted by the National Quality Council (NQC), as meeting the quality criteria for Training Packages.

Developing Assessment Tools

When developing their own assessment materials, assessors must ensure that the tools:

- are benchmarked against the selected Competency Standard Unit(s)
- are benchmarked against the industry-preferred competency assessment model
- are reviewed as part of the validation of assessment strategies as required under AQTF Standard 9.2i of the *Standards for Registered Training Organisations*
- meet the assessment requirements expressed in the *Standards for Registered Training Organisations*, particularly AQTF Standards 8 and 9.

A key reference for assessors engaged in developing assessment materials is the Training Package for Training and Assessment [TAA04] and Develop assessment tools [TAAASS403A].

Conducting Assessment

This section details the mandatory assessment requirements and provides information on equity in assessment including reasonable adjustment.

Mandatory Assessment Requirements

Assessments must meet, at minimum, the criteria set out in Standard 8 from the *Standards for Registered Training Organisations* which is reproduced below.

8 RTO Assessments

The RTOs assessments meet the requirements of the endorsed components of Training Package and the outcomes specified in accredited courses within the scope of its registration.

8.1 The RTO must ensure that assessments, regardless of whether through a training and assessment pathway or an assessment-only pathway:

- i comply with the Assessment Guidelines included in the applicable nationally endorsed Training Package or the assessment requirements specified in accredited courses;
- ii lead to the issuing of a Statement of Attainment or qualification under the AQF when a person is assessed as competent against nationally endorsed Competency Standard Units in the applicable Training Package or any additional information related to knowledge and skills specifications (e.g. modules) prescribed in the applicable accredited course;

- iii comply with the principles of validity, reliability, fairness and flexibility;
 - iv provide for applicants to be informed of the context and purpose of the assessment and the assessment process;
 - v where relevant, focus on the application of knowledge and skill to the standard of performance required in the workplace and cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills, and include transferable knowledge and skills to new situations and environments;
 - vi involve the evaluation of sufficient evidence to enable judgements to be made about whether competency has been attained;
 - vii identify issues related to techniques, OHS, language and literacy, cultural diversity, under-represented groups, and employability skills.
 - viii provide for feedback to the applicant about the outcomes of the assessment process and guidance on future options;
 - ix are equitable for all persons, taking account of cultural and linguistic needs; and
 - x provide for reassessment on appeal.
- 8.2 a The RTO must ensure that RPL is offered to all applicants on enrolment.
- b The RTO must have a RPL process that:
 - i is structured to minimise the time and cost to applicants; and
 - ii provides adequate information and support to enable applicants to gather reliable evidence to support their claim for recognition of competencies currently held, regardless of how, when or where the learning occurred.

Access and Equity

An individual's access to the assessment process should not be adversely affected by restrictions placed on the location or context of assessment beyond the requirements specified in this Training Package.

Reasonable adjustments can be made to ensure equity in assessment for people with disabilities. Adjustments include any changes to the assessment process or context that meets means the individual needs of the person with a disability, but do not change competency outcomes. Such adjustments are considered 'reasonable' if they do not impose an unjustifiable hardship on a training organisation or employer. When assessing people with disabilities, assessors are encouraged to apply good practice assessment methods with sensitivity and flexibility.

1.3.08 Guidelines for Designing Assessment Materials

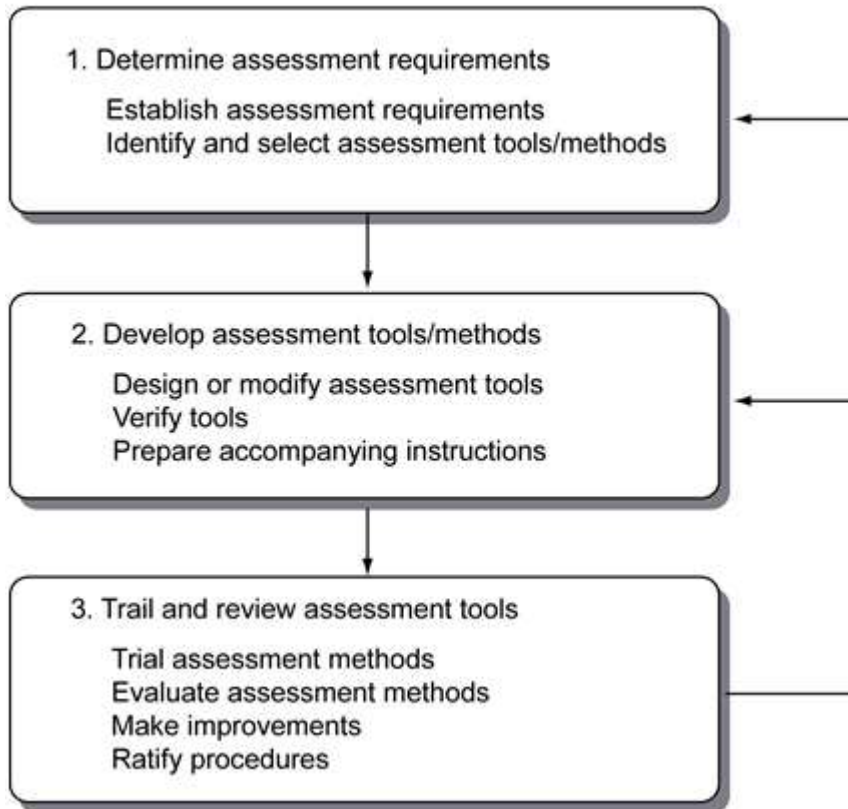
3.8 Guidelines for Designing Assessment Materials

Assessment Materials are developed, designed and implemented by appropriately authorised and competent assessors. The materials may range from relatively straight forward questions/answers and task tests to quite elaborate simulations for assessing concepts and values. Assessment materials for the Electricity Supply Industry – Transmission, Distribution and Rail Sector need to facilitate the process of assessment by:

- detailing the personnel and material preparations required to support the **assessment** process.
- establishing and/or confirming the circumstances under which the assessment is to take place.
- detailing the evidence to be collected and the method(s) to be used to do this.
- providing for the systematic review/analysis of the evidence and for the making of logical and supportable judgments.
- providing the means for the recording of the process and the judgments as required and in accordance with any regulatory and/or industry preferred arrangement
- providing a basis for post-assessment.
- providing **counselling** and guidance for the candidate.
- identify specialist technical advice related to such things as OHS, LLN, **environmental** and equity matters.

Assessment Material Design Process

Process for designing assessment materials



a) Determine assessment requirements

Establish assessment requirements. In the development of tools and methods of assessment, the assessor will need to determine the range of methods appropriate to the assessment context and the characteristics of the person being assessed. The assessor may use the following questions when designing the assessment method:

1. Is the data **gathering** process sufficient, timely, valid and reliable to ensure the decision about competence relates to the overall requirements of the Unit?
2. Do you always need to assess real work?
3. How is the **critical** evidence specified?
4. How many **assessment** tasks are required to collect the critical evidence of competency?
5. Which **assessment** tasks will provide broad coverage of the Range Statement?
6. Are there any skills that the candidate should have or can develop before they are assessed for the Unit?

Identify and select assessment tools/methods. The assessor will be required to identify and select the assessment methods consistent with Electricity Supply Industry – Transmission, Distribution and Rail Sector assessment guidelines and procedures.

b) Develop assessment tools/methods

Design or modify assessment tools. The assessor will be required to design or modify existing assessment tools so that their format, language, literacy and numeracy requirements are appropriate to the characteristics of the assessment context and the person being assessed.

Verify tools. The assessor will need to verify the assessment tools, which maintain validity but are easy to administer, and allow sufficient flexibility to meet the range of possible assessment contexts.

Prepare accompanying instructions. The assessment system/process must be comprehensively and clearly documented so that the stages of assessment and their constituent parts may be observed and evaluated. The assessment materials must relate directly to the Competency Standard Unit or group of units making up a qualification and address the totality of competency in a realistic, holistic and effective way.

c) Trial and review assessment tools

Trial and validate assessment tools. The assessor will be required to trial and validate the assessment methods with a representative group of people similar to those who will ultimately be assessed. Once trials are conducted the assessor will need to seek responses from all parties and compile and analyse these responses.

Evaluate assessment methods. The assessor will evaluate the assessment methods and tools for clarity, reliability, validity, fairness and cost-effectiveness.

Make improvements. The assessor will modify the assessment tools based on the responses to the trials.

Ratify procedures. The assessor ratifies, with relevant people in the Electricity Supply Industry – Transmission, Distribution and Rail Sector, procedures of the evidence requirements, assessment methods and assessment tools and the processes used in developing them.

Assessment Material Requirements

Essential requirements to be met by assessment materials include the following:

Assessment of Competency Standard Units. Assessment must directly address the Competency Standard Unit or group of units making up a qualification or skills cluster and, within this, satisfy the *critical aspects of evidence* including the related performance criteria, Range Statement and essential knowledge and associated skills.

Assessment of practical applications. Summative assessment of practical applications should, whenever possible and practicable, be conducted in a real work environment or in a realistically simulated work environment. Removal of the summative assessment from the real work environment should occur only to the extent necessitated by circumstances such as safety, noise, excessive cost and disruption to equipment operation, and access to the required work.

Learning Outcomes or other curricula documents. Outcomes are not to be the primary focus of summative assessment unless their direct relationship to the Competency Standard Unit(s) is formally approved by industry and recorded.

Assessment of essential theory. Summative assessment of the theory (essential knowledge and associated skills) underpinning competent performance is to be sufficiently rigorous and searching to ensure that individuals comprehend why they are doing something, the options they may use to achieve the required goal, and the fact that they can recall and/or locate and, interpret and transfer this information in varying contexts if it is needed at some other time. Typically, the specific level of depth and breadth the individual is required achieve is contained in industry and RTO sponsored essential knowledge and associated skills learning specifications that are aligned to respective Competency Standard Units.

Assessment of learners with low language/literacy/numeracy skills/under-represented groups. Assessment systems need to be capable of being applied in cases of low language/literacy/numeracy skills/under-represented groups. Reasonable adjustment strategies to address assessment of those with low language, literacy and numeracy skills and under-represented groups should be included in any Assessment Materials used by Registered Training Organisations, and be consistent with the quality assurance requirements of State Training Authorities for registration.

Range of assessment methods and their uses

Types of assessment

A variety of assessment types apply and can be used individual or in combination. These are:

Direct observation. Observe the learner carrying out their usual practical tasks in the workplace. This may be accompanied by questions. Direct observation is probably the easiest and most convenient method of assessment.

Third party reports. Information provided from immediate supervisory or other appropriate persons. An external assessor may not have the opportunity to make multiple observations of a candidate over a period of time, unlike an internal (in-house) assessor. The external assessor may obtain third party reports to supplement an assessment.

Demonstration and questioning. Candidate gives a demonstration of a practical task. If there is no opportunity to observe this competency in the standard work environment, the assessor may ask the candidate to provide a practical demonstration. The assessor can see both the process and the finished product.

Pen and paper tests and essays. These are used to measure the extent of knowledge or may test problem-solving capability. They can compliment practical demonstration.

Oral tests. These can be an adjunct to practical demonstration.

Projects. These tend to be unsupervised. The assessor uses the final product on which to base a judgement.

Simulation. This may involve an off-site practical test. The actual tasks and conditions are similar to real life situations and are in accord with prevailing industry policy enunciated by the Industry Skills Council for the industry. A Simulation Policy has been developed and can be obtained at www.ee-oz.com.

Portfolios. These are used for assessing skills achieved in the past. They can include work samples.

Profiling. Information gathered over time from a structured profiled data entry card and resultant report.

Assessment Methods

Assessment methods must be appropriate to the situation. Learners can be encouraged to use these methods for self-assessment. Combinations of these methods will be required for most situations (e.g. observations and oral questioning).

The recommended assessment methods outlined above, to collect the various kinds of evidence required to determine the candidate's competency, are:

A — oral questioning

B — structured observation of work

C — indirect supporting evidence (supervisor's reports)

Not all the methods need to be used. For example, during the assessment period the assessor may find that they don't need all three methods to collect sufficient evidence. The assessor may also plan to use other, equally valid, combinations of assessment methods.

It is recommended that assessors use open questions in conjunction with direct observations to assess the candidate's ability to:

- apply relevant knowledge to the particular task.
- perform the required tasks safely and efficiently.
- handle unforeseen contingencies and circumstances.
- recognise and solve problems associated with the whole job (which may not necessarily occur during the assessment).

It is recommended that supervisor's reports or verified calculations are used to confirm that workplace job activities have been completed on time and meet the required specifications. This is particularly relevant when the assessor may not be present for the total duration of the workplace job activity and/or the learner/candidate works as part of a team.

More information is also contained in section 3.10 Guide to assessment methods and items.

1.3.09 Sample assessment instruments to support training and assessment material design

3.9 Sample assessment instruments to support training and assessment material design

Information related to assessment material design, training and assessment activities, and sample assessment materials against competency standard units in this Training Package is included in Appendix B — Sample assessment instruments to support training and assessment material design.

1.3.10 Guide to Assessment Methods and Items

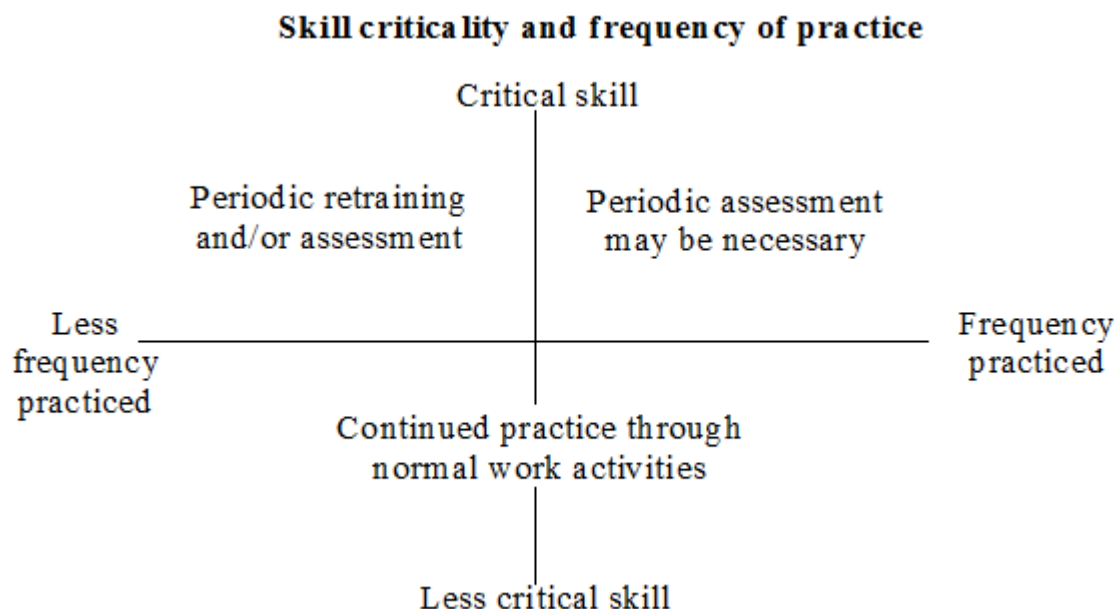
3.10 Guide to Assessment Methods and Items

(Informative)

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity and electrical equipment carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. These considerations can be summarised as follows:



Irrespective of these considerations the assessment methods and instruments used should satisfy the conditions associated with sufficiency, currency, authenticity, validity, reliability, and be holistic in nature.

The following *Table F.1 – Guide to Assessment Methods and Items* provides a summary of assessment methods in common use and the situations in which they may apply.

Table F.1 Guide to Assessment Methods and Items

Assessment method	Appropriate instruments	Valid purposes or use	Conditions and numbers	Time constraints	Repeat assessments possible
Written objective tests	True/false Multiple choice Matching Completion	Confirming essential factual knowledge, principles Assessing deduction, transfer of knowledge Complementing other methods	Controlled classroom High level supervision Large numbers	Moderate	Many
Written responses, short and extended answers	Calculations Definitions, explanations Essays	Assessing use of information Application of knowledge General ideas and solutions Research, organization and expression of concepts or ideas	Test condition as above or Minimal supervision, and assistance	Moderate	Many
Oral test/ technical interview	Set question Scenarios	Assessing depth and breadth of knowledge Application of knowledge Relative to experience	Interview condition One to one	Moderate	Many
On job or	Observation,	Identifying	Normal	High	Nil to many

workplace assessment	<p>checklist</p> <p>Product assessment</p> <p>Questioning to complement observations</p>	<p>mastery or competence of practical task, technical skill or interpersonal skill in real or simulated setting</p> <p>Identifying gaps in education and training</p>	<p>working conditions</p> <p>Moderate level supervision</p> <p>One to one</p> <p>Avoid expensive or hazardous situations</p>		depending on assessment of product or process
Practical/ Exercises	<p>Stimulated work exercises</p> <p>Structured practical exercises</p> <p>Fault finding exercises</p>	<p>Checking mastery or competence of a practical task, technical skill, or subset of performance in a simulated work setting</p>	<p>Controlled laboratory or field setting</p> <p>High level supervision</p> <p>10 to 15</p>	Low	Several
Practical projects	<p>Research task or investigation</p> <p>Product or process development</p> <p>Individual learning contract</p>	<p>Assessing integration and application of a number of work related skills to solve a given problem</p> <p>Assessing individual approaches, innovation, creativity</p> <p>Assessing interaction with others</p>	<p>Access to laboratory, workshop or workplace</p> <p>Little supervision</p> <p>10 to 15</p>	Low	Several
Assignments	<p>Resource life</p> <p>Case studied</p> <p>Poster presentation</p> <p>Reports of video or speaker presentations</p> <p>Reports of</p>	<p>Confirming competence to research, analyse and synthesise information</p> <p>Assessment of application of knowledge, skills and attitudes where practical</p>	<p>Moderate of level control</p> <p>Non-test conditions</p> <p>Little supervision</p> <p>10 to 15</p>	Low	Several

	laboratory/field work, excursions Individual learning contracts Writing simple manuals or procedures	testing is not feasible Assessment of communication skills			
Personal appraisal	Checklists or criteria which enable peer or self assessment	Establishing readiness for summative assessments Assessment of an individual's performance within a team effort	Non-test conditions Little supervision Small numbers	Low	Many
Verbal assessment	Oral exposition or lecture Seminar, presentation and group discussion Oral/aural tests Interviews	Confirming understanding of principles underpinning performance Supplement to other assessment methods Verification of learner's submitted work.	Moderate level of control High level of supervision One to one	Low	Several
Profiling¹	Structure manual or computer-based log.	Tracks competency development against the industry standard profile specified by CSUs. Identifies when remedial action is required during development period.	² Real work conditions under workplace supervision. Off-job assessment events Any number	Low / Medium	On going

¹A valid profile is based on periodic collection of relevant data over the duration of a competency development training program.

²A complete profile is constructed from all required evidence of competency, however where a profile of only workplace performance is used it must be supplemented with other methods such as those outlined in this table.

1.3.11 Guidelines for Conducting Assessments

3.11 Guidelines for Conducting Assessments

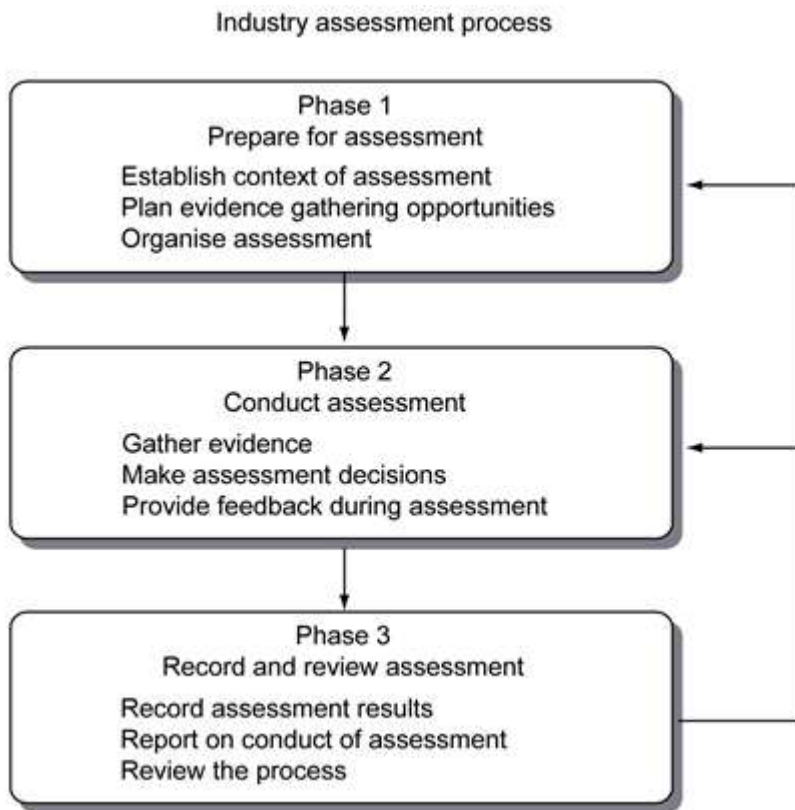
The following describes the industry-preferred process for conducting assessments against the Competency Standard Unit(s) in this Training Package. This process applies to all assessments conducted for the purposes of national recognition in both institutional and workplace contexts.

Assessment within the Electricity Supply Industry – Transmission, Distribution and Rail Sector is to be carried out by a Qualified Assessor who will have been trained in the conduct of assessment. The main issues to be satisfied during the conduct of assessment include the following:

- Assessment should be planned, arranged and organised well in advance of the event/process.
- The candidate should be involved in the planning and preparation so that their readiness and availability is assured, and their advice on evidence collection opportunities may be considered.
- The environment within which assessment is to occur is acceptable to the parties and conducive to the assessment process.
- The Assessor's actions throughout the process are firm, fair, friendly and unambiguous.
- Specific rulings on safety breaches are explained up-front and acted on in accordance with the assessment materials.
- The assessment process should contain no surprises for any party.
- Feedback is provided as required throughout the assessment process.
- Post assessment activities including recording, reporting, counselling etc. are finalised promptly.
- Candidates will invariably be accepting of the outcomes of an assessment process in which:
 - they consider they were treated fairly, consistently and with dignity.
 - they were given the full opportunity to demonstrate their capabilities.
 - the reasons for the assessment decisions were appropriate, logical and constructively explained.
- the assessment judgements are conveyed in a sensitive and constructive manner.

The following provides an overview for assessment within the Electricity Supply Industry – Transmission, Distribution and Rail Sector. It outlines the process involved in conducting assessment in both the institutional and workplace context, and consists of three major components that each assessor will need to do:

Prepare for Assessment



The assessor:

- establishes the context and purpose of the assessment
- identifies the relevant Competency Standard Unit(s), assessment guidelines and qualification framework in this Training Package which contains the vocational standards for industry including the relevant performance measures applying to assessment
- identifies any NTQC noted support materials that have been developed to facilitate the assessment process
- analyses the competency standards and identifies the evidence requirements
- identifies potential evidence collection methods
- identifies issues related to techniques, OHS, language and literacy, cultural diversity, under-represented groups and employability skills. Prepare the Candidate

The assessor meets with the candidate to:

- discuss and confirm the purpose of assessment with the candidate and where appropriate, the employer
- explain the context and purpose of the assessment and the assessment process;
- explain the competency standards to be assessed and the evidence to be collected and ensure the candidate has access to the relevant competency standards and other relevant information;
- explain and obtain agreement to the assessment procedure
- advise on self-assessment, including processes and criteria;
- outline the assessment procedure, the preparation the candidate should undertake, and answer any questions.
- assess the needs of the candidate and, where applicable, negotiate reasonable adjustment for assessing people with disabilities without compromising the integrity of the competencies;
- seek feedback regarding the candidate's understanding of the Competency Standard Unit(s), evidence requirements and assessment process;
- determine if the candidate is ready for assessment and, in consultation with the candidate, decide on the time and place of the assessment;
- develop an assessment plan.
- discusses the Electricity Supply Industry – Transmission, Distribution and Rail Sector and enterprise assessment policy with the candidate (they need to understand how the competencies to be assessed will fit in with the Industry training policy and preferred framework or enterprise arrangements for training and assessment. The assessor should also understand what the candidate has done to acquire the knowledge and skills).

Plan and Prepare Evidence-Gathering Process

Practical assessment should preferably be conducted on site. However, if on-site practical assessment is not possible then off-site assessment at a mutually agreeable site could be appropriate. It can be part of the current work (i.e. observation of current tasks) or a demonstration (i.e. a simulated task).

The assessor must:

- establish a plan for gathering sufficient quality evidence about the candidate's performance in order to make the assessment decision (and involve industry representatives in the development of plans for the validation of assessment)

- identify opportunities to gather evidence of competence which occurs as part of the workplace activities;
- ensure the planned approach to gathering evidence will provide sufficient, reliable, valid and fair evidence of competence
- source or develop assessment materials to assist in the evidence gathering process.
- choose the techniques that will be used to assess the candidate's knowledge and skill;
- organise equipment or resources required to support the evidence gathering process.
- check the assessment environment permits fair, valid and reliable assessment and that it is safe and accessible;
- inform other relevant people of assessment plans, coordinate and brief other personnel involved in the evidence gathering process;
- identify the need to gather additional evidence which may not occur as part of workplace activities; and
- considers issues related to techniques, OHS, language and literacy, cultural diversity, under-represented groups and employability skills..

Collect the Evidence and Make Assessment Decisions

The assessor must:

- establish and oversee the evidence gathering process to ensure its validity, reliability, fairness, flexibility and consistency.;
- collect appropriate evidence and assess this against the Elements, Performance Criteria, Range Statement and Evidence Guide in the relevant Competency Standard Unit(s)
- evaluate evidence in terms of the four dimensions of competency - task skills, task management skills, contingency management skills, and job/role environment skills
- incorporate allowable adjustments to the assessment procedure without compromising the integrity of the competencies;
- evaluate the evidence in terms of validity, consistency, currency, equity, authenticity and sufficiency;
- gathers evidence related to techniques, OHS, language and literacy, cultural diversity, under-represented groups, key competencies and skills enabling employment;
- consult and work with other staff, assessment panel members or technical experts involved in the assessment process;
- document the evidence gathered in accordance with the assessment procedure and record details of evidence collected;
- make a judgement about the candidate's competency based on the evidence and the relevant Competency Standard Unit(s) and the criteria specified in the assessment procedure.

Provide Feedback on the Assessment

The assessor must provide advice to the candidate about the outcomes of the assessment process. This includes providing the candidate with:

- clear and constructive feedback on the assessment decision
- information on ways of overcoming any identified gaps in competency revealed by the assessment
- the opportunity to discuss the assessment process and outcome
- information on reassessment and the appeals process.

Record and Report Results

The assessor must:

- record the assessment outcome according to the policies and procedures of the RTO
- maintain records of the assessment procedure, evidence collected and the outcome according to the policies and procedures of the RTO
- maintain the confidentiality of the assessment outcome
- organise the issuing of qualifications and/or Statements of Attainment according to the policies and procedures of the RTO.

Review Assessment Process

On completion of the assessment process, the assessor must:

- review the assessment process
- report on the positive and negative features of the assessment to those responsible for the assessment procedures
- if necessary, suggest to appropriate personnel in the RTO ways of improving the assessment procedures.

Participate in the Reassessment and Appeals Process

The assessor must:

- provide feedback and counsel the candidate, if required, regarding the assessment outcome or process, including guidance on further options
- provide the candidate with information on the reassessment and appeals process
- report any disputed assessment decision to the appropriate personnel in the RTO
- participate in the reassessment or appeal according to the policies and procedures of the RTO.

Review and Maintenance of the Assessment System

The developer and custodian, EE-Oz Training Standards of this Training Package which contains the vocational standards for industry is responsible for the ongoing monitoring and review of these Assessment Guidelines. This process will be incorporated in the general review and maintenance of this Training Package.

1.3.12 Maintenance of Assessment Guidelines

3.12 Maintenance of Assessment Guidelines

The Electricity Supply Industry – Transmission, Distribution and Rail Sector Assessment Guidelines were developed by, and are therefore owned by the industry.

The Assessment Guidelines must be maintained so that it reflects the ongoing needs of the Industry sector and responds in a timely manner to changed technologies, work organisation, skills development and related circumstances.

Responsibility for maintaining of the Assessment Guidelines is shared by the parties who constitute the sector:

- Assessment Guidelines maintenance will be coordinated and managed by EE-Oz Training Standards in its role as a declared Industry Skills Council for ElectroComms and EnergyUtilities
- Suggestions and proposals for changes from all parties are welcome. These should be documented and submitted to EE-Oz Training Standards the DEEWR declared Industry Skills Council for the ElectroComms and EnergyUtilities Industry.

1.3.13 General Resources

3.13 General Resources

AQF Implementation Handbook, Third Edition. Australian Qualifications Framework Advisory Board, 2002 <http://www.aqf.edu.au>

Australian Quality Training Framework (AQTF) – for general information go to:
<http://www.DEEWR.gov.au/aqtfWhat.asp>

Australian Quality Training Framework (AQTF) – for resources and information go to:
(<http://www.DEEWR.gov.au/pubBundle.asp?qsID=10>)

Australian Quality Training Framework Standards for Registered Training Organisations, Australian National Training Authority, Melbourne, 2001. Available in hard copy from DEEWR or can be downloaded from <http://www.DEEWR.gov.au/pubBundle.asp?qsID=10>
BSZ98 Training Package for Training and Assessment. This is available from the following organisations and can be viewed, and components downloaded, from the National Training Information Service (NTIS). National Training Information Service, an electronic database providing comprehensive information about RTOs, Training Packages and accredited courses. (<http://www.ntis.gov.au/>)

Training Package Development Handbook, Australian National Training Authority, Melbourne, 2001. Available in hard copy from DEEWR or can be downloaded from <http://www.DEEWR.gov.au/publication.asp?qsID=213>

Style Manual for Training Package Endorsed Components, Australian National Training Authority, Melbourne, December, 2003. Available in hard copy from DEEWR or can be downloaded from <http://www.DEEWR.gov.au>

Assessment Resources

Training Package Assessment Guides a range of resources to assist RTOs in developing Training Package assessment materials developed by DEEWR with funding from the Department of Education, Training and Youth Affairs. It is made up of 10 separate titles, as described at www.DEEWR.gov.au/project/tpAssessment/. Go to www.resourcegenerator.gov.au/loadpage.asp?TPOAG.htm

Printed and / or CD ROM versions of the Guides can be purchased from Australian Training Products (ATP). The resource includes the following guides:

1. Training Package Assessment Materials Kit
2. Assessing Competencies in Higher Qualifications
3. Recognition Resource
4. Kit to Support Assessor Training
5. Candidate's Kit: Guide to Assessment in Australian Apprenticeships
6. Assessment Approaches for Small Workplaces
7. Assessment Using Partnership Arrangements
8. Strategies for ensuring Consistency in Assessment
9. Networking for Assessors
10. Quality Assurance Guide for Assessment
11. Delivery and Assessment Strategies.

Assessment Tool Design and Conducting Assessment

VETASSESS and Western Australian Department of Training and Employment, 2000, *Designing Tests - Guidelines for designing knowledge based tests for Training Packages*.

Vocational Education and Assessment Centre 1997, *Designing Workplace Assessment Tools*, A self-directed learning program, NSW TAFE.

Manufacturing Learning Australia, 2000, *Assessment solutions*, Australian Training products, Melbourne.

Rumsey, David 1994, *Assessment practical guide*, Australian Government Publishing Service, Canberra.

Assessor Training

Australian Committee on Training Curriculum (ACTRAC), 1994, *Assessor training program - learning materials*, Australian Training products, Melbourne.

Australian National Training Authority, *A Guide for Professional Development*, DEEWR, Brisbane.

Australian National Training Authority, *Facilitator Packs for Certificate IV in Training and Assessment*.

Australian National Training Authority, *Facilitator's Pack for Train Small Groups and Assessment*.

Australian Training Products Ltd, *Training and Assessment, Training Package — Toolbox*.

Green, M., Moritz, R., Moyle, K. and Vale, K., 1997, *Key competencies professional development Package*, Department for Education and Children's Services, South Australia.

Victorian TAFE Association, 2000, *The professional development CD: A learning tool*, VTA, Melbourne.

Conducting Assessments

Bloch, B. and Thomson, P., 1994, *Working Towards Best Practice in Assessment: A case study approach to some issues concerning competency-based assessment in the vocational education and training sector*, NCVET, Adelaide.

Docking, R., 1991, *An A-Z of Assessment Myths and Assessment in the Workplace, Competence assessment briefing series*, No. 4, Employment Department, Perth, Western Australia.

Hawke, Geoff, 1996, *Integrating Assessment of Learning Outcomes*, Assessment Centre for Vocational Education, Sydney.

Hawke, Geoff, 1995, *Work-based Learning: Advice From Literature*, Assessment Centre for Vocational Education, Sydney.

National Assessors and Workplace Trainers Body, *Putting it into practice* [Training Package implementation Guide].

Parsloe, E., 1992, *Coaching, Mentoring and Assessing: A practical guide to developing competence*, Kogan Page, London.

Rumsey, David, 1993, "*Practical issues in Workplace Assessment*" in National Assessment Research Forum: A forum for research into competency-based assessment. [VEETAC Competency Based Training Working party Assessment Steering Group], NSW TAFE Commission, Sydney.

Rumsey, David, 1994, *Assessment Practical Guide*, Australian Government Publishing Service, Canberra.

Evidence-Gathering Methods

Australian National Training Authority, 1998, *A new assessment tool*, DEEWR, Melbourne.

Gonczi, A. (ed.), 1992, *Developing a competent workforce: adult learning strategies for vocational education and training*, TAFE National Centre for Research and Development, Adelaide.

Kearney, Paul, 1992, *Collaborative assessment techniques*, Artemis, Tasmania.

National Assessors and Workplace Trainers Body, *The evidence resource kit - containing language, literacy and numeracy video and CD ROM* -

National Assessors and Workplace Trainers Body, *The evidence workbooks*

Assessment System Design and Management

Office of Training and Further Education 1998, *Demonstrating best practice in VET project – assessment systems and processes*, OTFE Victoria.

Toop, L., Gibb, J and Worsnop, P, *Assessment system designs*, Australian Government Publishing Service, Canberra.

Western Australia Department of Training and VETASSESS 1998, *Kit for Skills Recognition Organisations*, WADOT, Perth

National Centre for Vocational Education and Research, 1996, *Integrating assessment: removing the on the job/off the job gap*, Conference papers from 4-6 June, Western Australian Department of Training.

OTFE, 1998, *Demonstrating best practice in VET project - assessment systems and processes*, Victoria.

Wilson, P., 1993, *Integrating workplace and training system assessments*, Testing Times Conference, NCVER, Sydney.

Field, I., 1995, *Managing organisational learning*, Longman, Melbourne.

Recognition of Current Competency/ Recognition of Prior Learning

Recognition and Assessment Centre, 1994, *New place: Same Skills. A guide for people from non-English speaking backgrounds*, Office of Multicultural Affairs, DEET.

Recognition and Assessment Centre, *A Flexible Approach to Recognition Practices: RPL as a Framework*, Melbourne Recognition and Assessment Centre, PO Box 299, Somerton, Vic 3062, Telephone (03) 9254 3000.

1.3.14 Further Sources of Information

3.14 Further Sources of Information

This section provides a listing of useful contacts and resources to assist assessors in planning, designing, conducting and reviewing of assessments against this Training Package which contains the vocational standards for industry.

Contact	Details
National Industry Skills Council (ISC) for the ElectroComms and EnergyUtilities Industry	EE-OZ Training Standards PO Box 1202 DICKSON ACT 2602 Telephone: 02 6241 2155 Fax: 02 6241 2177 Email: ee-oz@ee-oz.com.au Website: www.ee-oz.com.au
Western Australia ITC	WA IEU ITC Inc PO Box 597 BALCATTWA WA 6021 Tel: 08 9240 2688 Fax: 08 9240 2930 E-mail: info@ieu.com.aumailto:
New South Wales ITAB	NSW U&E ITAB PO Box 615 DARLINGHURST NSW 1300 Tel: 02 9266 0001 Fax: 02 9261 5511 Email: mailto:naomi@uensw.com.au
Victoria	EPIC Industry Training 29 Drummond St CARLTON VIC 3053 Tel: 03 9654 1299

Contact**Details**

Fax: 03 9654 3299

Email: epicitb@epicitb.com**Contact****Details****South Australia****Electrical, Electrotechnology, Energy & Water Skills Board**

PO Box 2584

REGENCY PARK SA 5010

Tel: (08) 8347-4008

Fax: (08) 8219-0015

Email: admin@eeewsb.com.au**Queensland****Energy Skills Queensland**

PO Box 273

SALISBURY QLD 4107

Tel: 07 3277 1333

Fax: 07 3276 8252

Email: energyskillsqld@energyskillsqld.com.au**Northern Territory****Major Industries Training Advisory Council**

GPO Box 1610

DARWIN NT 0801

Tel: 08 8981 0077

Fax: 08 8941 7470

Email: mitac@mitac.org.au**Access to Assessment Resources****Learning Resources****EE-OZ Training Standards**

PO Box 1202

DICKSON ACT 2602

Telephone: 02 6241 2155 Fax: 02 6241
2177

Email: ee-oz@ee-oz.com.au

Website: www.ee-oz.com.au

Australian Training Products Ltd

Level 25, 150 Lonsdale Street

MELBOURNE VIC 3000

PO Box 5347BB

MELBOURNE VIC 3001

Telephone: (03) 9655 0600

Fax: (03) 9639 4684

Website: <http://www.atpl.net.au>

Email: sales@atpl.net.au

1.3.15 Appendix A - Australian Apprenticeships

Appendix A — Australian Apprenticeships

New Apprenticeships are work related competency programs designed for entry-level contracted employment for new entrants to the industry. All qualifications in this Training Package could be open to use as New Apprenticeships and are governed by State/Territory Training Authority arrangements and their limitations.

New Apprenticeships offer both employers and employees:

- relevant training
- a range of support service arrangements.

They typically involve paid work and structured training and are underpinned by a training contract, which is registered with the relevant State/Territory Training Authority. Completion of the competency development program leads to an AQF qualification.

In some instances, and subject to any relevant State/Territory Training Authority arrangements, existing non-apprenticed workers may be eligible for New Apprenticeship opportunities. Inquiries with the relevant State/Territory Training Authority should be made in this regard.

Like traditional apprenticeships, Australian Apprenticeships involve a commitment from:

- the employer to provide an environment for systematic training of the Australian Apprentice
- the Australian Apprentices to apply themselves to learning the requirements of their vocation
- a Registered Training Organisation (RTO)¹ to be responsible for providing the vocational education, training and assessment support services and the eventual issuing of a national qualification

¹ For more information on RTOs see DEST's 2005 Australian Quality Training Framework Standards for Registered Training Organisations, effective from 1 July 2005 publication.

In the Electricity Supply Industry - Transmission, Distribution and Rail Sector, Australian Apprenticeships are available for all the qualifications outlined in this Training Package. Australian Apprentices seeking one of the national qualifications will be required to undergo a training program or course of study that involves learning and assessment activities. The related learning and assessment activities are documented and involve:

- the employer
- the employee
- the RTO.²

² TAFE Institutions, Universities with TAFE sectors, Skills Centres and similar enterprises that can deliver vocational training are eligible to become RTOs.

On successful completion of the training program or course of study an RTO will issue the Australian Apprentice a national qualification.

Entry Requirement

Under Australian Apprenticeships, the employer is able to determine the relevant employment criteria for recruiting a new entrant into the Electricity Supply Industry. The choice, however, is usually dependent on enterprise employment practices and needs including requirements that may be imposed by relevant regulations and codes of practice.

There is, however, a common set of attributes/profiles that are industry preferred for the recruiting of Australian Apprentices. Some of the more common ones are:

- Any person aged 15 years or more can apply for a Australian Apprenticeship.
- Most employers require applicants who have completed at least Year 10 of a secondary school education program.
- Employers customarily prefer applicants who have successfully completed Years 11 or 12 of a secondary school education program or a post secondary education pre-employment course.

Potential entrants should be aware that employers are looking for the following personal attributes:

- effective numeracy and literacy skills
- effective communications skills
- acceptable presentation
- punctuality
- a positive attitude
- interest in the industry as a career
- ability to work at heights or in confined spaces and around moving machinery
- ability to distinguish between colours.

For entry-level employment based contracted training Australian Apprenticeships the composition of the relevant qualification needs to be determined in accordance with the completion requirements detailed here and be subsequently agreed to between the respective parties.

General principles regarding the composition of qualifications are as follows:

- Competency Standard Units making up a qualification must be appropriate to the work being performed and be performed by the person seeking the qualification
- Competency Standard Units making up a qualification must be appropriate to the level and integrity of the qualification sought.

The terms and conditions for employment based entry-level contracted training require a training agreement or contract, which will be provided by State or Territory Training Authorities. Such an agreement is called an Apprenticeship/Traineeship Training Contract, which requires parties to the contract to select the appropriate qualification, Competency Standard Units and to adopt an industry-preferred model or design a new training plan/program. Additionally, the responsibilities of the parties to the contract will be contained therein.

The employment of an Apprentice (sometimes also called a Trainee) by an Employer is subject to the relevant legislation and any applicable industrial instrument, order or determination made under that related Statutory Act. Appropriate information should be obtained from relevant authorities in this regard.

General principles governing the Competency Development Program

Consultation between the RTO, the employer and apprentice/trainee will have occurred and agreement reached on the Competency Development Program that will be delivered. Typically the RTO will adopt the industry-preferred approach where regulatory arrangements are in place or design an appropriate program in concert with the Industry. The apprentice/trainee would be expected to undertake the Competency Development Program in order to attain competence in the given qualification.

The Competency Development Program

A training contract provides a description of the process for undertaking training during the life of the program. This is developed in consultation with the RTOs.

The Training Program

1. Expected duration of workplace program in hours

The training program will detail the anticipated duration in hours that the apprentice/trainee is expected to undertake in order to gain the necessary competencies. Information regarding the suggested nominal duration for respective AQF levels of Australian Apprenticeships is available from respective parties and includes EE-Oz Training Standards. The training plan will outline the requisite on and off-the-job arrangements that apply to it.

2. On-the-job skills development program

In consultation with the apprentice/trainee and employer, the RTO would outline how it intends to monitor the on-the-job component, i.e. providing advice on how evidence is to be gathered when the apprentice/trainee is in the workplace. Apprentices/trainees are expected to assist RTOs in gathering and submitting workplace evidence as per the industry-preferred approach. This is particularly important where regulatory arrangements are in place. RTOs in turn monitor the performance of the apprentice/trainee and provide appropriate feedback to them and the employer.

3. Off-the-job skills development program

The training contract will detail, where applicable, the off-the-job (technical education) program the RTO will deliver in order to gain the necessary underpinning skills and knowledge. This is typically a program preferred by the industry undertaken by the apprentice/trainee. For example where modules or essential knowledge and associated skills strategies apply, the number, title and duration of each will generally be advised. This will also include the expected duration of the technical educational program in hours.

Typical duration — Australian Apprenticeships

In developing this Training Package due regard has been given, by industry, to a range of influencing factors associated with the typical period of employment and related training for individuals seeking a qualification, using the Australian Qualification Framework (AQF). In developing such, regard has also been given to the NTQC policy on providing industry advice on this matter.

As a general rule it is expected, that by employing the respective techniques and processes detailed in the preferred and adopted industry training model, those employed and undertaking training to satisfy the outcomes of Competency Standard Units, as new entry-level recruits, will take a "nominal duration" of employment to complete. EE-Oz Training Standards has developed industry advice in relation to the nominal duration of employment to assist users in their activities. Detailed information on typical new apprentice durations, at each of the AQF levels is available from EE-Oz Training Standards. This detail can be obtained directly from EE-Oz Training Standards or found on the EE-Oz Training Standards website at www.ee-oz.com.au. Additionally, more specific information may be contained within any related support materials that may exist as non-endorsed components of this Training Package and in particular the industry-preferred training plan applicable to each qualification.

Nominal duration of training is generally defined by State, Territory and Federal Training Authorities policies and/or regulations. Typically these are set out in State/Territory Training Package Implementation Guides. Interested State/Territory parties should ensure they refer to the relevant Training Package Implementation Guide. These can be accessed via the respective State/Territory Training Authority websites.

1.3.16 Appendix B - Sample Assessment Instruments

Appendix B — Sample Assessment Instruments

These instruments are designed to Support Training and Assessment Material Design. This Appendix provides advisory and sample information for assessment material design against Competency Standard Units in this Training Package. It is principally about training and assessment activities that can be used to benchmark quality outcomes.

It provides information about assessment material design and other resources available to support implementation of the Training Package. The information contained herein shows how these resources relate to the workplace and where they can be obtained. It includes sample assessment tools (sample instruments) developed to assist those involved in benchmarking their activities for gathering evidence about workplace activities and workplace experiences for training and assessment purposes.

Sample assessment instruments included were developed for documenting workplace experiences related to the requirements of this Training Package. The assessment strategies and instruments are primarily for use as advisory information for workplace assessors and/or their agents (workplace supervisors or technical experts) who may be employees of Registered Training Organisations or enterprises.

A number of terms used refer to aspects of implementing the Training Package. A Glossary of Terms (*see* Appendix A) is included to clarify the specific meaning of these terms.

This Appendix should be read in conjunction with the following publications:

- The respective volumes of this Training Package
- Training Package for Training and Assessment TAA04
- Training Acts and Regulations in the relevant Australian State or Territory
- Policies of the Registered Training Organisation (RTO) involved with training and assessment for the Industry.

Sources of Education, Training and Assessment Information

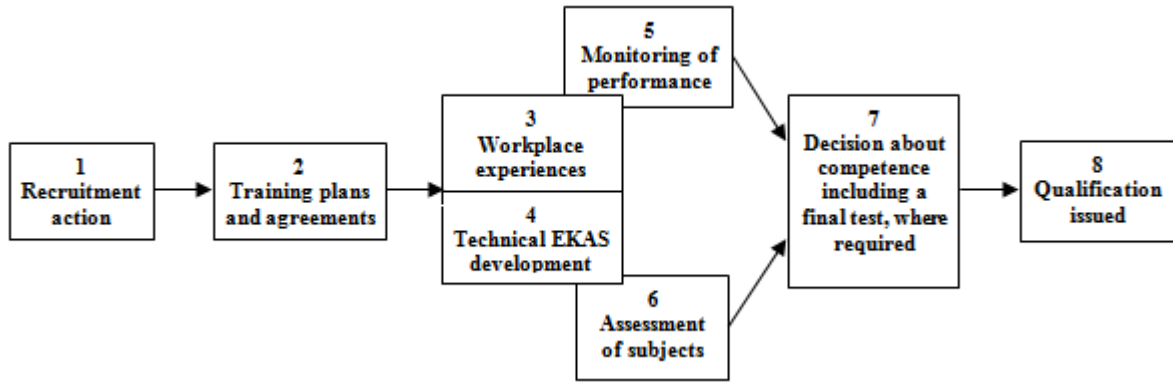
This section shows how the Training Package and associated resources relate to recruitment, training, assessment and recognition activities which may be undertaken by Industry, enterprises and/or Registered Training Organisations.

This section also introduces a competency development and/or recognition model based on combined on and off-the-job training, as well as a model that allows individuals to have previous learning and work experience recognised.

Combined on and off-the-job competency development model

The model shown below is a simplified version of the detailed contracted new entry level industry-preferred competency development model which combines on and off-the-job education, training and assessment leading to competent performance. A detailed copy of the model is available from EE-Oz Training Standards website at www.ee-oz.com. This model recognises that learning occurs as a result of:

- experience in recurring workplace events
- directed workplace learning activities
- structured off-the-job essential knowledge and associate skills technical educational activities.



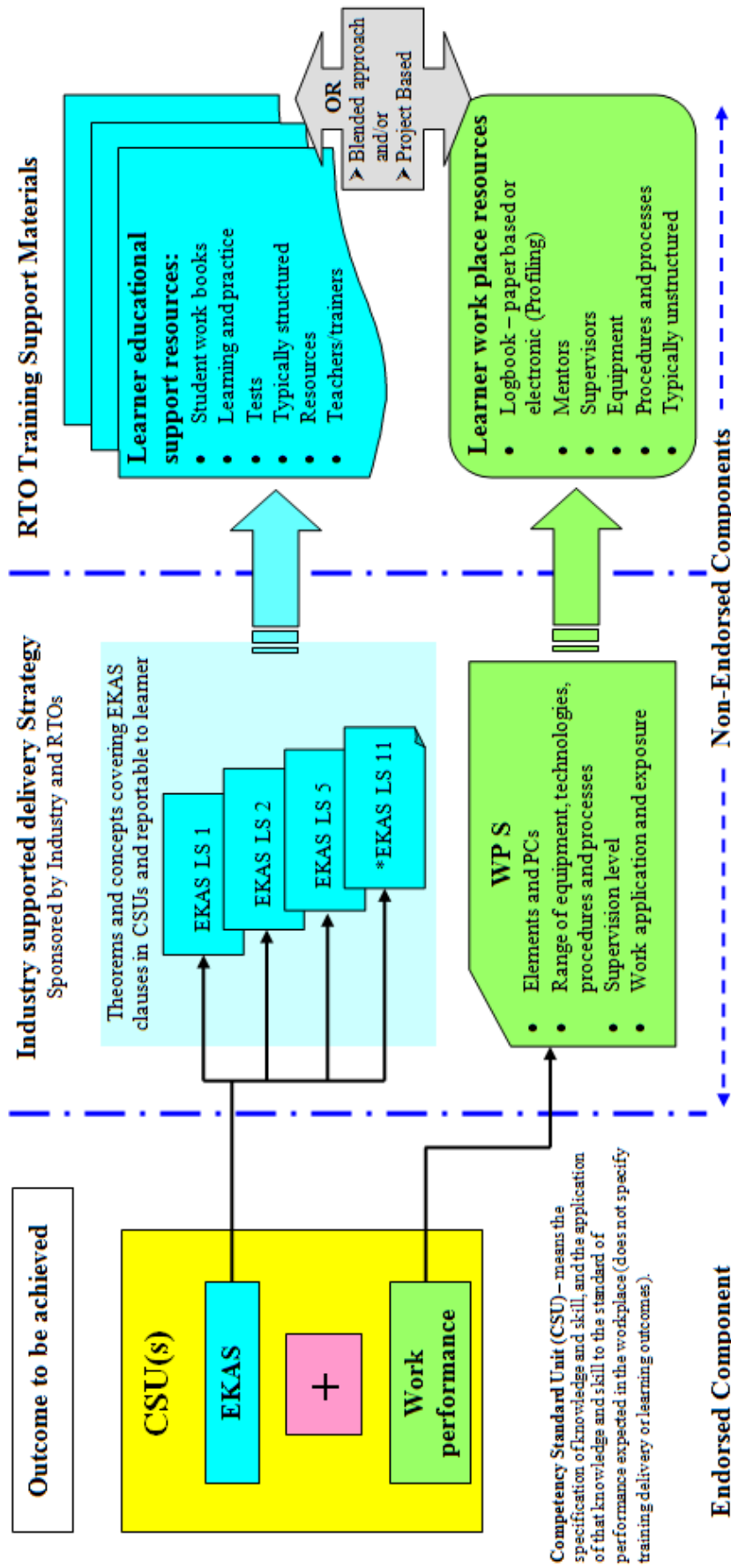
Competency Development Model

This model is structured around a new entry level learner undertaking a full competency development program. The model can also accommodate the assessment of prior learning within the continuum of new entrant to competent. In this way it is consistent with the Assessment Pathways outlined in this Assessment Guidelines part of the Training Package.

New Entrant Training and Assessment Materials and Resource Design and Development

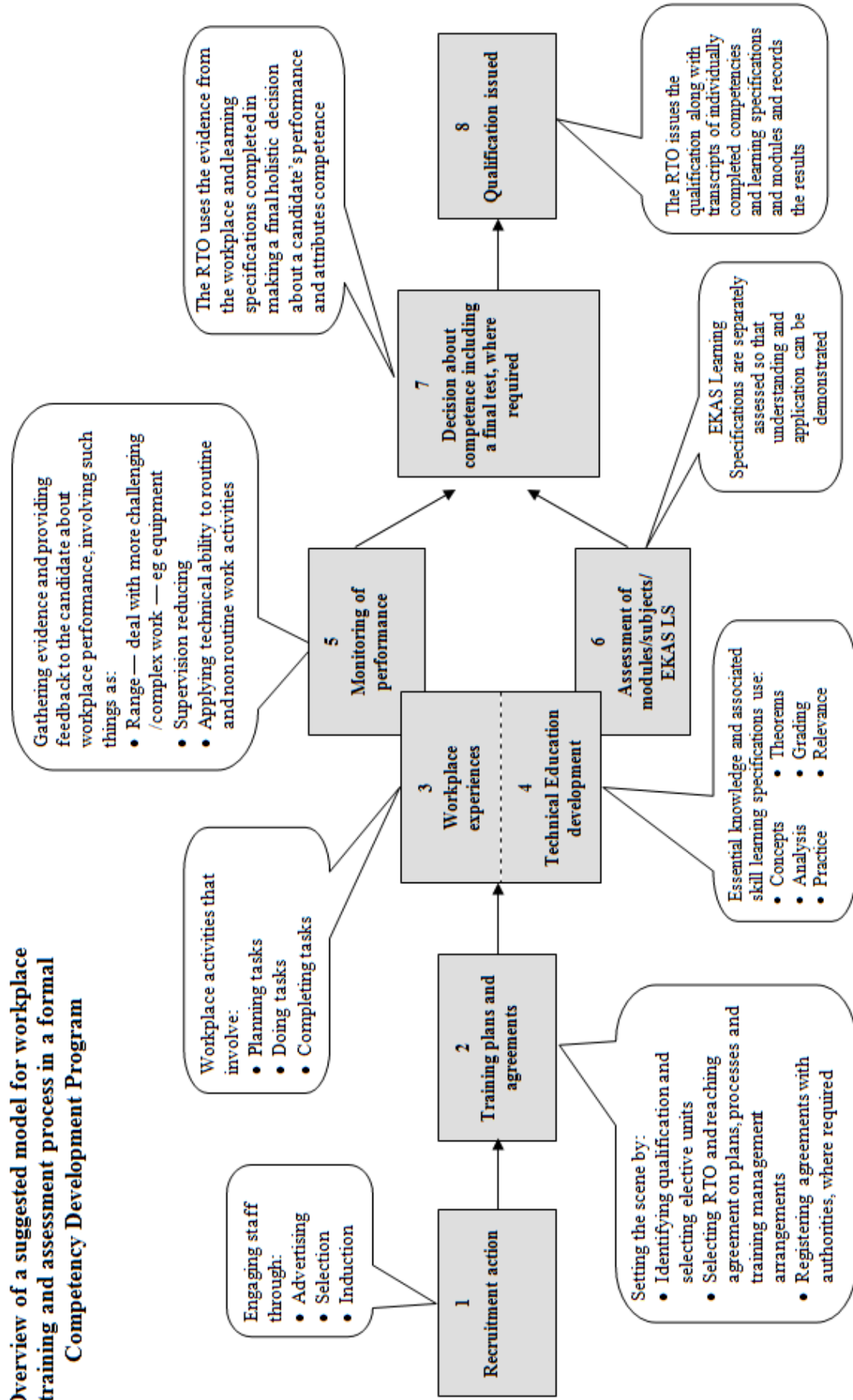
In designing training and assessment materials and resources to support new entrant competency development consideration should be given to the preferred Industry approach to learner development. The concept model detailed on the next page explores how training and assessment materials and resources may be best developed for one or many Competency Standard Units. RTOs using this approach ensure increased consistency in meeting the specifications in learning and work performance against the Competency Standard Units, and in developing the learner in a cost effective way with little disruption to the day-to-day operation of the workplace. It also assures that a learner having completed aspects of, but not the full array of, Competency Standard Unit(s), can be accorded information that is sufficient to warrant recognition for learning content (Essential Knowledge and Associated Skills) that is transferable to other environments in the Industry.

RTO competency development training design model for new entrants using one CSU as an example



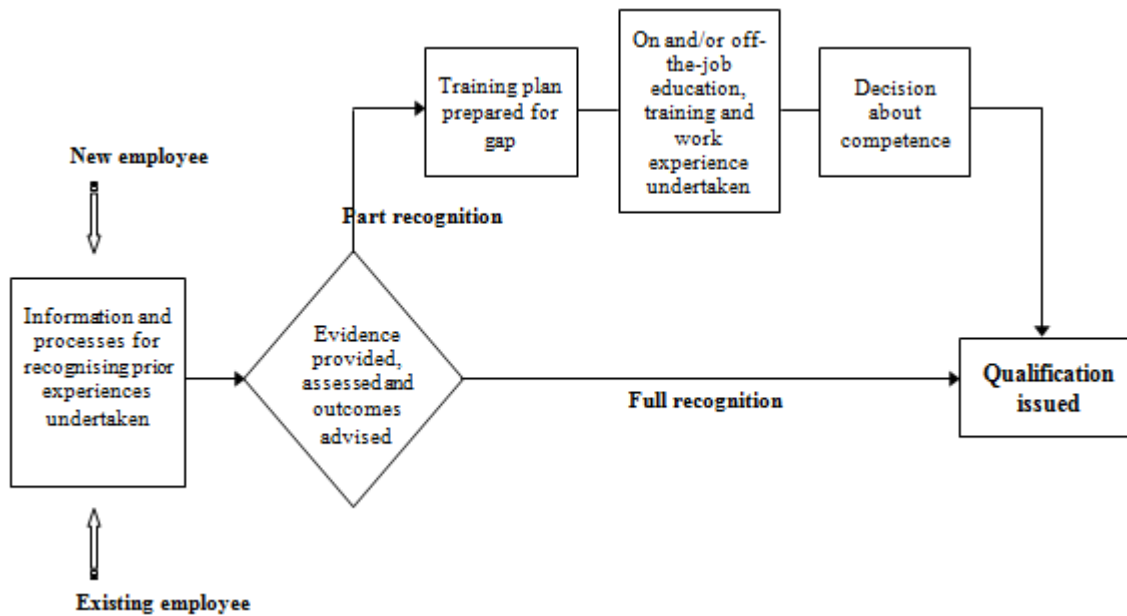
EKAS LS – Essential Knowledge and Associated Skills Learning Specifications = where EKAS LS 1 — may cover many units, EKAS LS 2 — may cover a number of units, EKAS LS 5 — may cover several units, and/or EKAS LS 11 – may be unique to the unit (refer to Volume 1 Part 2 and Volume 2 Part 2 for more detail)

Overview of a suggested model for workplace training and assessment process in a formal Competency Development Program



Recognition of Prior Learning/Experience Model

A typical process for candidates seeking to have their prior experiences recognised within the model is shown in the following diagram.



Learning and Assessment strategies

The skills and knowledge required by a competent worker are described in terms of Competency Standard Units. To be assessed as 'competent', against competency standards, individuals need to demonstrate they have achieved the requisite workplace functions and have also acquired the specified essential knowledge and associated skills (EKAS) underpinning performance.

A candidate wishing to be assessed against a specific competency standard unit(s) must be assessed by a qualified assessor. The assessor must use assessment processes, methods and tools which are in line with this Training Package.

Assessment involves gathering evidence to demonstrate that an individual has the necessary essential knowledge and associated skills required by the specified competency standard(s) together with requisite work performance. This may include assessment of knowledge and skills obtained through educational courses as well as through application of knowledge and skills in the workplace using workplace processes, equipment and activities.

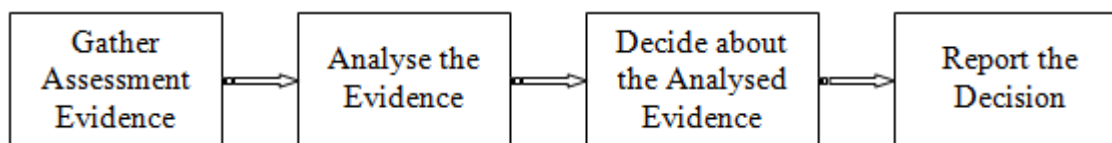
Assessment Planning

Good planning of workplace assessment is most important. The plan is to be based on a suitable process that is in line with the Competency Unit — TAAASS401A Plan and organise assessment from the Training and Assessment Training Package. Assessors need to address the following components of competence in Training Package TAA04, which cover:

- establishing evidence requirements for a specific context
- establishing suitable assessment methods
- developing assessment tools appropriate to a specific assessment context
- trialling assessment procedure.

The Assessment Process

The general process for assessing competence is shown in the following diagram.

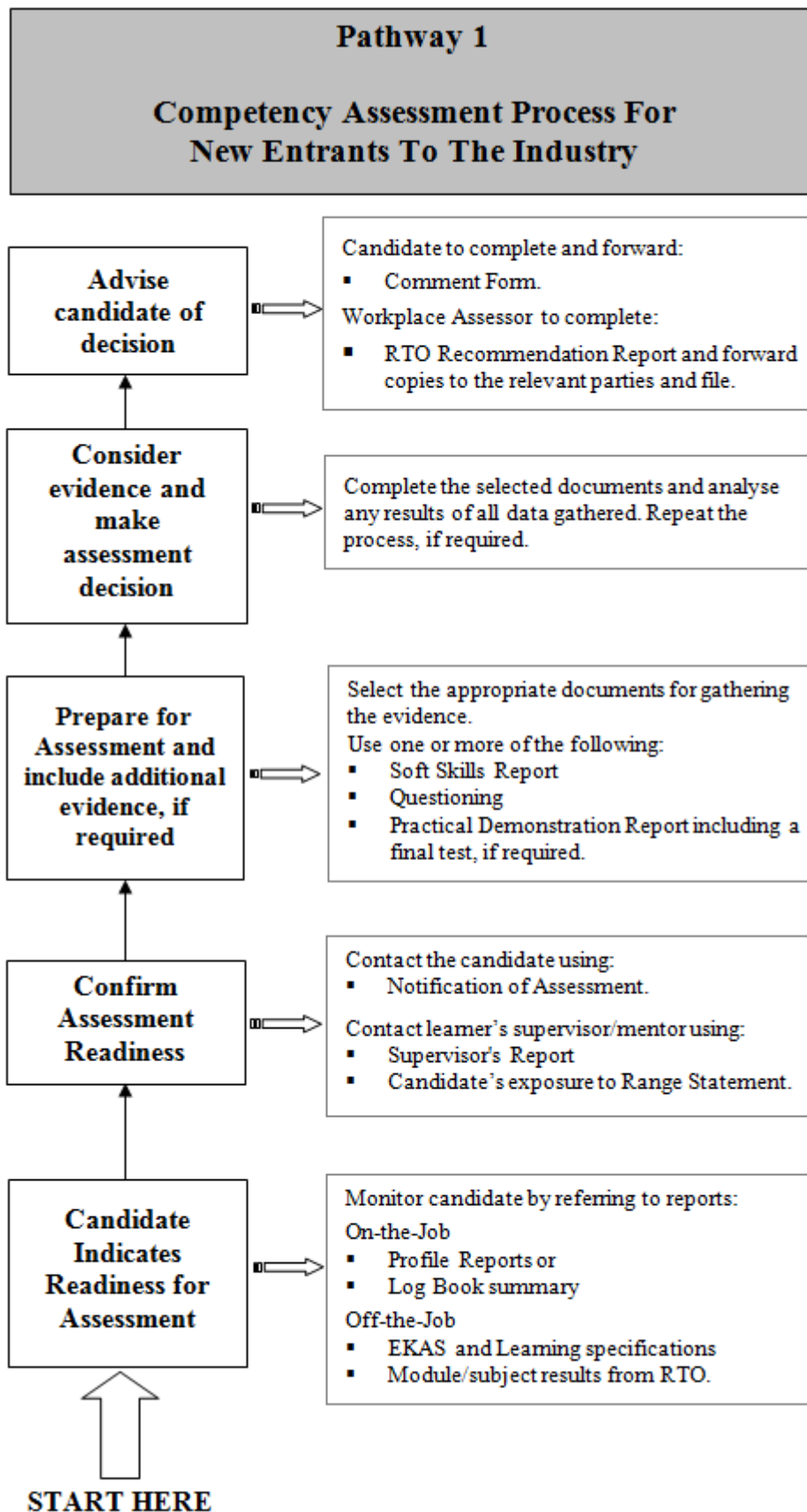


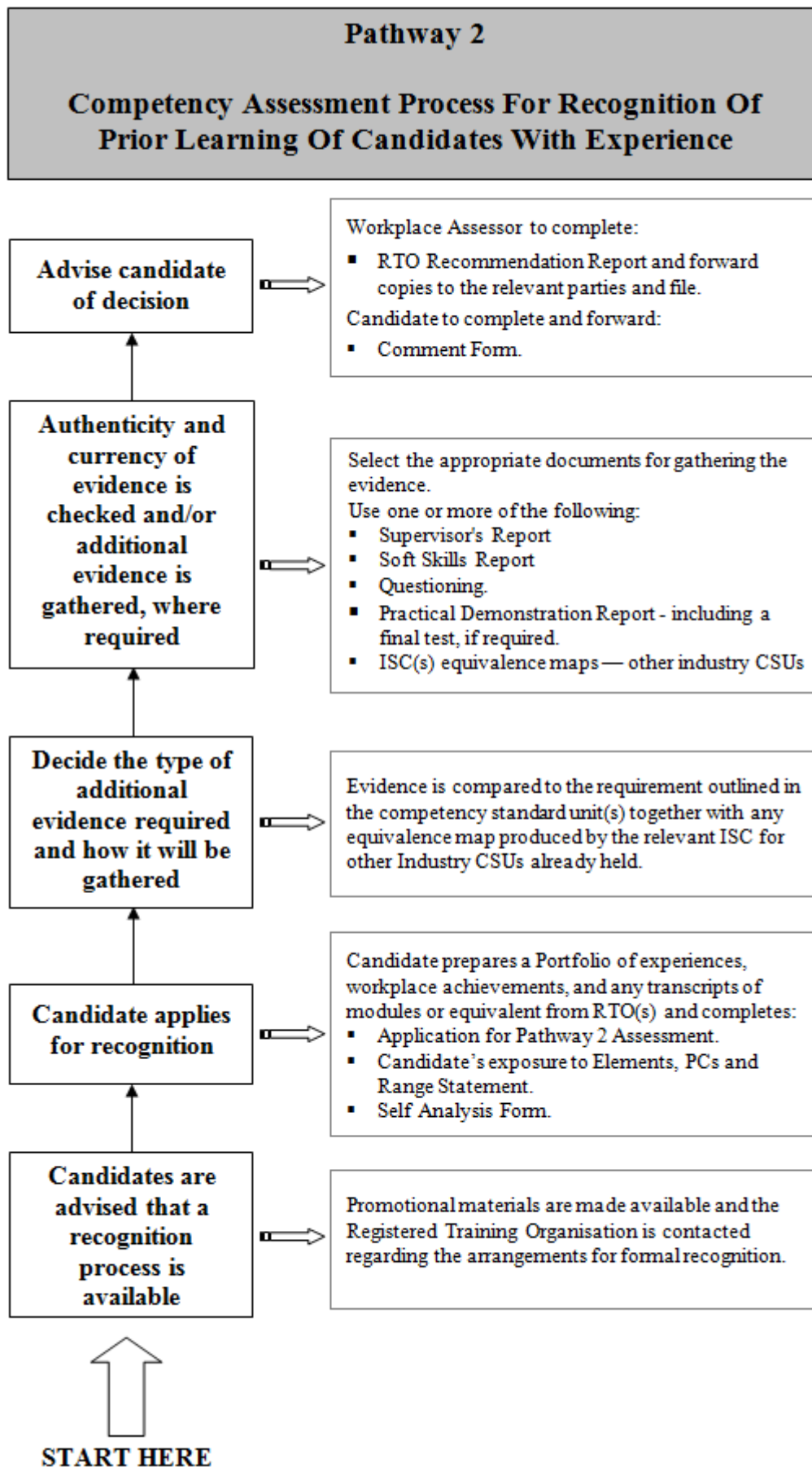
Assessors need to adapt the process to take account of physical and operational conditions as well as the characteristics and background of the candidate being assessed. Once the process has been finalised, the candidate should be advised.

The Assessment Guidelines of this Training Package identify three assessment pathways for the Industry, as follows:

- Pathway 1: For new entrants to the industry
- Pathway 2: Recognition of prior learning of those with experience in the Industry
- Pathway 3: Recognition of equivalent Competency Standards Units from other Industry Training Packages

Pathway 3 can be incorporated within the Pathway 2 processes and activities.





Establishing the Evidence Requirements

The Training Packages provides a clear statement regarding the evidence requirements in the Evidence Guide and in particular the critical aspects of evidence of each competency standard unit. The following is an extract from one competency standard unit.

‘Critical aspects of evidence’

Before the critical aspects of evidence are considered all pre-requisites shall be met. Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines – UET09’. Evidence shall also comprise: A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range

Apply sustainable energy principles and practices as specified in the performance criteria and range

Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported on the preferred approach; namely a percentile graded result.

Demonstrate an appropriate level of employability skills.

Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures and

- Demonstrated performance across a representative range of contexts from the prescribed items below: (Example shown)

A — Selecting correct tools and testing equipment.

B — Identifying visual non-compliance defects

C — Using effective methods for conducting mandatory and optional tests

D — Identifying non-compliance from test results.

E — Identifying causes of non-compliance.

F — Completing mandatory reporting.

G — Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items’

The evidence on which competency in this unit is deemed shall be considered holistically.

‘Items’ of evidence that industry has deemed critical and that also relate directly to the Performance Criteria and Range Statements could include:

- Specific tools, plant and equipment.
- Specific testing techniques
- Any advice limiting assessment to actual workplaces, for example because of licensing, regulatory or unique infrastructure requirements
- Specific licensing and regulatory requirements.
- Any advice dealing with unexpected and non-routine contingencies by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment.

Assessment Methods

Assessment involves determining whether a candidate has provided sufficient evidence to demonstrate that they have a specified level of skills and knowledge which they can apply in their work environment.

The evidence provided may include, for example:

- work activity records
- a transcript of training outcomes
- a portfolio of learning experiences
- a self-assessment by the candidate against the relevant competency standard(s).
- supervisor's report(s), addressing requirements of the identified competency standard(s).
- practical demonstration.
- details of training undertaken linked to requirements of the identified competency standard(s), such as a profiling or 'many samples' reports
- outcomes of a challenge test.

The assessor may use a variety of assessment methods to gather evidence. Appropriate methods for documenting workplace experiences related to this Training Package are:

- on-the-job work observation
- practical exercises in the workplace or under simulated workplace conditions
- appraisal and report by a supervisor/trainer or colleague
- questioning and discussion with the candidate
- written/practical test
- any Industry Skills Council equivalence mapping declaration for Competency Standard Units held from other Industry Training Packages

Develop the Assessment Tools

The assessment tools include:

- instruments for gathering evidence — samples included as Enclosure A in Appendix A
- forms for administering the process — samples included as Enclosure B in Appendix A
- assessment design materials Glossary of Terms — included Enclosure C in Appendix A.

Trial the Assessment Procedure

It is very important to trial the assessment strategy. There is a need to make sure it is appropriate to the context in which the assessment is conducted. This will involve such things as:

- Focus on the specific requirements of the competency standard unit being assessed.
- Consideration of the characteristics and background of the person being assessed to make sure the assessor supports the candidate in their understanding of the process and the skills and knowledge that need to be demonstrated.
- Use of assessment methods and instruments to make sure the evidence gathered:
 - - addresses the conditions required to meet the Critical Aspects of Evidence as outlined in this Training Package and related Competency Standard Units
 - - is drawn from a variety of sources and reflects the required range of work circumstances

- - provides reasonable certainty that the evidence submitted is sufficient, current and authentic.

The selection and application of assessment tools is a decision made by assessors. There is no standard answer, however the following is provided as general guidance.

- Assessors need only gather enough evidence so they can make a judgment that competence has been demonstrated. Too much evidence may be difficult to analyse in a consistent manner, whereas insufficient evidence fails to satisfy the assessment criteria.
- Assessors need to adjust or modify the assessment processes and tools as required, within the constraints of achieving a valid, reliable and fair outcome.
- Assessors need to make sure assessment procedures satisfy the principles of assessment (validity; reliability; flexibility; fairness).
- Assessors need to be cognisant and use the industry-preferred assessment approach, as a first option.

1.3.17 Enclosures

Enclosures

Enclosure A: List of Sample Assessment Instruments

Enclosure A1	Work activity records
Enclosure A2	Transcript of training outcomes
Enclosure A3	Portfolio
Enclosure A4	Self analysis
Enclosure A5	Candidates exposure to Range Statement
Enclosure A6	Supervisor's report
Enclosure A7	Supporting skills report
Enclosure A8	Questioning
Enclosure A9	Practical demonstration
Enclosure A10	Final/challenge test
Enclosure A11	Contracted entry level Profiling Model

Enclosure A1 — Work Activity Records

Work Activity Records may be produced in paper-based or in electronic form. Each Work Activity Record may relate to a group of Competency Standards or if need be a Competency Standard Unit.

The activities and experiences recorded in this mode mostly relate to recurring workplace events associated with elements of performance involving exposure to a range of plant, tools, equipment, components and operating systems that are representative of normal work activities. Activities such as these, under appropriate levels of supervision, are important to a candidate's development.

Such records provide valuable data for:

- Candidates and their supervisor's to track progress in acquiring work-based competencies.
- Assessors to make decisions about a candidate's level of competence.

Work Activity Records summarise:

- relevant activities – (elements) and jobs/tasks undertaken at work
- associated resources used (such as tools, plant/equipment, procedures, and operating systems)
- the period of exposure to each type of task
- the level of supervision provided in the workplace.

This type of record is completed by the Candidate in conjunction with their Supervisor and signed by this Supervisor. It is important that workplace experiences are documented by candidates to help them see how their work experience is developing respective skills and knowledge specified in the relevant Competency Standard Units. Assessors, as a result of the records, can easily analyse them to determine if:

- exposure to the desired workplace activities has occurred
- the level of supervision is in keeping with the degree of autonomy required by the Competency Standard Unit
- the learner is able to perform 'whole of job' activities.

The ElectroComms and EnergyUtilities Industry Skills Council trading as EE-Oz Training Standards has a model paper based document that candidates can use to record their workplace activities and experiences. The document is called a User Guide. It is formatted in a way that links workplace activities to Competency Standard Units.

More information, including User Guides and techniques for recording workplace experiences electronically are available from the EE-Oz Training Standards at website: www.ee-oz.com.au.

Enclosure A2 — Transcript of Training Outcomes

Essential Knowledge and Associated Skills (EKAS) Learning Specifications and related results using training modules/topics/subjects that are completed off-the-job develop an individual's technical underpinning knowledge and skill. This may apply where the Industry expects such due to the regulated or preferred nature of work.

These learning specifications provide the learner with the essential underpinning knowledge and associated skills required to:

- deal with both routine and non-routine technical activities
- readily adapt their skills when new technologies are introduced
- transfer skills to new work environments.

The Registered Training Organisation (RTO) who is issuing the credential can generally provide current information about an individual's progress in the essential knowledge and associated skills or mapped modules/topics/subjects.

Learners that have undertaken a recognised structured training program with an RTO should submit a formal transcript – "Statement of Results" (training outcomes) from the issuing RTO as evidence, for inclusion in the process of competency assessment.

Candidates seeking recognition of prior learning need to provide evidence of knowledge and skills equivalent to the content of the essential knowledge and associated skills specifications (modules/topics/subjects), detailed in the Competency Standard Units in which they are being assessed as well as their workplace experiences if competence is sought in the Competency Standard Unit(s). Applicants for recognition of prior learning may also seek advice from the Registered Training Organisation about the equivalence status of available evidence of their acquired knowledge and skills.

The ElectroComms and EnergyUtilities Industry Skills Council trading as EE-Oz Training Standards at www.ee-oz.com.au can provide advice in regard to the availability of the essential knowledge and associated skills learning specifications for training modules/topics/subjects, which have been aligned to respective Competency Standard Units and essential knowledge and associated skills clauses.

Enclosure A3 — Portfolio

A portfolio is a collection of documents that demonstrate an individual's professional experiences and achievements in relation to identified competency standards. Typically, portfolios include information from a variety of sources including academic achievements, employment record, work activities, supervisor reports and references.

The candidate should prepare their own portfolio as an accurate reflection of their work and academic history and achievements.

Assessors advise candidates about the amount, type and format of evidence they should submit for assessment against identified Competency Standard Units.

The use of a Portfolio as an assessment instrument can be enhanced by the use of the Self-analysis form included as Enclosure A4.

Enclosure A4 — Self Analysis

A self-analysis involves the candidate in assessing their own level of skills and knowledge acquired through work experience and relevant training programs.

Candidates should complete a Self-Analysis Form in relation to each competency standard being assessed, identifying the evidence they can provide to demonstrate each required component of their skills and knowledge.

Assessors can check the references to determine if the evidence provided links directly or indirectly to the requirements outlined in Competency Standard Units and use this data as part of the overall assessment process.

Typically, the self-analysis form would be used for a Pathway 2 Assessment, however, it could have application in a Pathway 1 Assessment in certain circumstances.

Self-Analysis Application Form

This form allows the candidate to summarise their vocational experiences in relation to a particular Competency Standard Unit or a group of Competency Standard Units. The information provided is used to identify the list of competencies sought for assessment. They will need to support their responses to questions, claims and/or comments with authentic evidence. To do this, it is recommended that they develop a portfolio of evidence to be submitted with this self-analysis application form. They should be advised to cross reference the information they provide with the information provided in their Portfolio.

They must however, be provided with clear instructions about the information required before they complete each respective form. They also need to view and understand the detailed requirements of the Competency Standard Unit(s) against which they are seeking assessment.

A workplace assessor should assist them with the instructions and details.

They may need to submit a separate Self-Analysis Form for each Competency Standard Unit(s) for which they are seeking recognition. The Self-Analysis Application Form could be like the sample provided below.

Sample — Self-Analysis Application Form

Enter the codes and title of the National Qualification and title and codes the Competency Standard Unit(s) from qualification for which you are seeking recognition.

Title of National Qualification	Title and code of Competency Standard Unit(s) (For which recognition is being sought)
	•
	•
	•

	•
	•
	•

Enter the codes and titles of Certificates, Qualifications, Transcripts of Academic achievement, or Licences that you believe to be supporting evidence. (Remember to include these documents in your portfolio. You must be able to demonstrate how each document relates to the respective competency standards.)

Code and name of Certificate, Qualification, Transcript of academic record or Licence	Year Achieved

Note: For all Certificates, Qualification and associated transcripts of academic records identified above, a certified copy must be provided.

- Approximately how many jobs have you been involved in that relates to each of the respective Competency Standard Unit(s)?

Competency Standard Unit 1 _____ Jobs
 Competency Standard Unit 2 _____ Jobs
 Competency Standard Unit 3 _____ Jobs
 Competency Standard Unit 4 _____ Jobs
 Competency Standard Unit 5 _____ Jobs
 Competency Standard Unit 6 _____ Jobs
 Competency Standard Unit 7 _____ Jobs

- Give details about the **largest** job you have been involved with. Briefly describe the job and where it was carried out. (Portfolio Ref _____)
- Estimate the total amount of time (for all similar job mentioned above of all size) you have been involved with - tick box. (Portfolio Ref _____)

	Less than 1 week	1 to 4 weeks	4 to 10 weeks	10 weeks to ½ year	More than ½ year
1					
2					
3					
4					
5					
6					
7					

- Describe the level of involvement you have had in this type of work - tick box. (Portfolio Ref _____)

	Carrying out jobs organised by others	Carrying out jobs organised by others and completing all tests and/or writing of reports	Planning the job from the beginning, carrying out the work and completing all tests and writing of reports
--	---------------------------------------	--	--

1			
2			
3			
4			
5			
6			
7			

- To what extent were you involved in this type of work? - tick box.
(Portfolio Ref _____)

	Carrying out routine tasks	Carrying out and manage several routine tasks at one time	Deal with non routine tasks including diagnosing and rectifying faults	Organising others you work with and dealing with clients
1				
2				
3				
4				
5				
6				
7				

-
- How much training did you require to perform the work? - tick box.
(Portfolio Ref _____)

	Self taught skills	Basic technical knowledge and skills	Analytical technical knowledge and skills	People and customer skills

1				
2				
3				
4				
5				
6				
7				

- To what degree were you supervised when performing the work? - tick box.

Constant
supervision

General
supervision

Self
supervision

1
2
3
4
5
6
7

- Describe any special features or circumstances about the type of work you have been involved with. (Portfolio Ref _____)

- List as many different types of equipment items you used when you carried out the work associated with the Competency Standard Units. Make the list under headings such as plant, tools, components, systems and the like. A workplace assessor can assist you with the headings. A separate form may be provided for supplying this information. (Portfolio Ref _____)

Unit code	Unit title	Items	

- For the Competency Standard Units, have you completed a whole job using the equipment items listed above? Also indicate the number of times you have done so.

CSU - 1	Involvement (circle yes or no)			Number of times
	Planned the work	Yes	No	
	Carried out the work	Yes	No	
	Completed the work	Yes	No	

CSU - 2	Involvement (circle yes or no)			Number of times
	Planned the work	Yes	No	
	Carried out the work	Yes	No	
	Completed the work	Yes	No	

CSU - 3	Involvement (circle yes or no)			Number of times
	Planned the work	Yes	No	
	Carried out the work	Yes	No	

	Completed the work	Yes	No	
--	--------------------	-----	----	--

CSU - 4	Involvement (circle yes or no)			Number of times
	Planned the work	Yes	No	
	Carried out the work	Yes	No	
	Completed the work	Yes	No	

CSU - 5	Involvement (circle yes or no)			Number of times
	Planned the work	Yes	No	
	Carried out the work	Yes	No	
	Completed the work	Yes	No	

CSU - 6	Involvement (circle yes or no)			Number of times
	Planned the work	Yes	No	
	Carried out the work	Yes	No	
	Completed the work	Yes	No	

CSU - 7	Involvement (circle yes or no)			Number of times
	Planned the work	Yes	No	
	Carried out the work	Yes	No	
	Completed the work	Yes	No	

Declaration by Candidate

All the information provided is entirely factual:

Name:

Signed **Date:**

Enclosure A5 — Candidates Exposure to Range Statement

This assessment instrument augments other information needed for judging competence and, where required, should be completed by the candidate to provide a list of components, tools, systems, plant, test equipment and associated items outlined in the Range Statement in individual Competency Standard Units. As the Range Statement is a component part of the whole Competency Standard Unit(s) assessors should ensure the gathering of evidence by the candidate is considered a formative part of the assessment process and that once the evidence is presented a holistic approach to judging and attributing competence is exercised in conjunction with other related data.

A separate form is required for each Competency Standard Unit to be assessed. The assessor should complete the following parts of this form in conjunction with the candidate to make sure they are clear about what is required:

- Competency standard units Title and Unit Number
- Candidate's Name
- Date
- Range Statement - Item Group:
Please consult the Range Statement as described in section *Establishing the evidence requirements* of this Document. Each group alpha character is to represent an appropriate 'group' of variables, such as 'components', 'tools', 'system', 'plant, 'processes', 'equipment' etc, as required by the particular competency standard.
- Range Statement Items Involved:
Please list the particular items that have been predetermined as being 'Critical' from the critical aspects of evidence section when the evidence requirements were established (see *Establishing the evidence requirements*).

The candidate is to place a tick in the column against those items they have been exposed to in a work environment. Candidate should add to the list of items involved, where appropriate. Here is an example.

Competency standard unit – _____ <i>*(Assessor to complete this section)</i>		Candidate to Complete Identify the items you have worked on
*Range Statement Item Group	*Range Statement Items Involved	
A Personal protective equipment	Goggles	4
	Gas mask	4
	Boots	
	Gloves	4
B Wiring types	Aluminium	
	Copper	4

Candidate’s work experience with items in the Range Statement listed in this Competency Standard Unit

Competency standard unit title:		Unit no:
Candidate’s name:		Date:
Range Statement Item Group	Range Statement Items Involved	Candidate to Complete Identify the items you have worked on
A		

B		
C		
D		

Declaration by Candidate

All the information provided is entirely factual:

Name:

Signed **Date:**

Enclosure A6 — Supervisor’s Report

Typically, the ‘supervisor’ (mentor) approached to provide a report for competency assessment will have spent considerable time guiding or monitoring the candidate in his/her development by providing supervised workplace learning experiences, appropriate to the candidate’s ability.

Supervisors should be asked to comment on the candidate’s demonstrated ability to:

- Demonstrate specific skills as described in the respective aspects of the Competency Standard Units under assessment.
- Apply required essential underpinning knowledge and associated skills (e.g. as learnt in their technical studies) to the work undertaken.
- Work in a team or independently in a way that is productive and safe.

Comments made by the candidate’s supervisor/mentor are an important source of evidence for assessors.

The Supervisor's Report can be completed as part of the pre-assessment planning process or during any other part of the process. More than one supervisor can provide information. Assessors should make sure supervisors are clear about the specific detailed requirements of the Electricity Supply Industry – Transmission, Distribution and Rail Sector Competency Standards targeted for assessment.

Supervisor's Report on _____ (Learner's Name)	
Name of Supervisor/Assessor: _____	Date: ___/___/___
Position in organisation: _____ Contact number: _____	
Approximate time (cumulative) providing guidance to the candidate _____ days / hrs	
in Unit(s): _____	

Responses made by supervisors/mentors are for the purpose of providing information to a workplace assessor. The supervisor is not making a decision about competence. The assessor will include the information with other data in the decision making process.			
Question asked of the supervisor/mentor	Responses		
	Yes	Requires further training	No
Taking into consideration the candidate technical development and work experiences, can they:			
Carry out duties with confidence			
Work in a safe manner with care for self and others			
Perform tasks with the minimal amount of waste or rework			
Complete tasks within a reasonable time			
Identify ways of improving how jobs are done			
Initiate action to improve processes or practices			
Work with others to achieve the work outputs of the group			
Work independently to achieve work outputs			
Resolve non-routine work functions			
Other comments:			
Supervisor's/Assessor's Signature: _____ Date: / /			

Enclosure A7 — ‘Supporting Skills’ Report

‘Supporting Skills’ refer to non-technical skills, candidates must demonstrate this as part of their competency assessment.

They include, for example:

- The ability to work independently or in teams while dealing with customers.
- Knowledge of and ability to follow enterprise policies.
- Communication skills used in following and issuing instructions.
- Knowledge of and ability to address quality assurance requirements.
- Personal management and development skills.
- Knowledge of and ability to address environmental protection and sustainable energy policies issues.

Candidates must demonstrate these important attributes which are embedded in all Competency Standard Units in the Training Package.

Any Supporting Skills Report may be completed by an assessor, the candidate's supervisor or another third party. Following on this page is a brief description of what the various aspects of Supporting Skills cover.

Supporting Skills — What do they cover?

1. Enterprise Instructions

Technical manuals

Using enterprise or manufacturers' technical manuals to ensure equipment and parts are installed to manufacturer's specifications.

Quality systems

Plan, apply and contribute to quality systems.

Computers systems

Use enterprise documentation and record systems including, where appropriate the use data capture equipment such as; computers, information systems and technologies.

Environmental and sustainable energy requirements

The safe disposal of used oil, grease and chemicals and the reduction of electrical energy by turning of the lights and heating devices and the like minimise the impact that engineering practices have on the environment.

Occupational health and safety (OHS) requirements

Follow OHS and standard operating procedures in a manner that is safe to the individual and others.

Equal opportunity / Ethical practice / Cultural diversity.

Familiar with the enterprise, equal employment opportunity policies, ethical practices and principles and awareness of cultural diversity.

Enterprise vehicles

Vehicle log book details are completed accurately, ensure the vehicle is kept clean, secured and fuel and liquid levels are maintained.

2. Customer relations

Public

Provide courteous and informative advice during construction, maintenance or service activities.

Workers providing other services

Cooperate with workers providing other construction, maintenance or service activities.

Clients and land owners

Recognise the responsibilities and rights of clients and land owners.

Authorities

Recognise the responsibilities and rights of statutory and other authorities.

3. Self development

Systematic problem solving

Solve problems using technical literature, exploring theories, performing calculations and by making enquiries.

Personal well being

Maintain and promote personal well being in the workplace through fitness and by avoiding excessive use of alcohol, tobacco and other substances.

Time management

Being punctual, the timely completion of work activities, and the sequencing of activities to maximise the use of available time.

Professional development

Seek to improve technical ability by discussions with others or by technical research and on-going competency development.

4. Team work**Communications**

Communicate plans, information, intentions and safety criteria to others using appropriate means.

Team involvement

Contribute positively to the work-team environment.

Competency Enhancement

Participates in the training of others by sharing ideas, explanation of operating systems and detailing the working arrangements of components and equipment.

Instructions for Completing the Supporting Skills Report

The supporting skills report on the next page provides a means of recording information about a candidate's skills. A workplace assessor (or nominee) does this by referring to documentation, asking the candidate questions and/or seeking advice from the candidate's supervisor/mentor.

Complete the form in the following way.

Step 1

Place a cross (X) in the box to indicate areas from where evidence has been sourced.

Supporting Skills Report	
Candidate's name	Date
Supervisor's/Assessor's name	//
Enterprise instructions 1. Applies correctly without constantly making reference to them. 2. Refers to them regularly and applies information correctly. 3. Awareness of their existence but not referred to or used.	Rating ① 2 3
Technical manuals	X
Quality systems	X
Computer systems	X
Environmental requirements	X
	Identify a minimum of three.

Step 2

Review documentation and/or ask questions of the learner or their mentor/ supervisor.

Step 3

For each area, establish the appropriate level (1, 2 or 3) that reflects the capability of the learner. Place a circle around the corresponding number. Evidence should be collected from a number of sources before rating the candidate.

Note: A rating of 2 or 3 indicates further training or experience is required. A rating of 1 indicates the candidate has demonstrated their competence in this area.

Supporting Skills Report		
Candidate's name		Date
Supervisor's/Assessor's name		/ /
Enterprise instructions	Rating (circle #)	
1. Applies correctly without constantly making reference to them.	1	
2. Refers to them regularly and applies information correctly.	2	
3. Awareness of their existence but not referred to or used.	3	
Technical manuals		Identify a minimum of three.
Quality systems		
Computer systems		
Environmental and sustainable energy requirements		
Occupational health and safety requirements		
Equal opportunity/Ethical practice/Cultural diversity		
Enterprise vehicles		
Customer relations	Rating	
1. Customers are included in discussion effecting operational issues	1	
2. Knowledge of but limited application of customer relations.	2	
3. Requires more understanding of customer needs.	3	
Public		Identify a minimum of two.
Workers providing other services		
Clients and land owners		
Authorities		

Self development	Rating	
1. Desire to expand beyond the present job role.	1	
2. Keeps abreast of new products and services.	2	
3. Requires more understanding of the job role.	3	
Systematic problem solving		Identify a minimum of two.
Personal well being		
Time management		
Professional development		
Team Work	Rating	
1. Shares ideas, assists and accepts assistance from others	1	
2. Accepts ideas and assistance from others.	2	
3. Prefers not to assist or accept assistance from others	3	
Communications		Identify a minimum of two.
Team involvement		
Competency enhancement		

Enclosure A8 — Questioning

It may be necessary as part of the assessment process, to gather additional evidence to clarify specific aspects of competence, especially in relation to the associated performance criteria. The RTO Assessor (or their nominee) may need to ask questions of the candidate, their supervisor or their trainer. A form is provided in this enclosure for documenting their responses.

The form provides guidelines for questioning a candidate about the performance criteria related to each element of competence. Typically, the elements in each of the Competency Standard Units in this Training Package follow a similar structure. Principally they generally cover *planning for*, *carrying out* and *completing* the job function.

In this section of the Document you will also find two tables which provide guidelines for assessing a candidate's response to these questions.

If the assessment is formative (as part of a training process) then the response given by the candidate should be consistent with the 'Appropriate coverage to questions – level 1'.

If the assessment is summative (final) the responses should be consistent with the 'Appropriate coverage to questions – level 2'.

Note to assessors:

- As Competency Standard Units are typically structured around PLAN \Leftarrow CARRY OUT \Leftarrow COMPLETE jobs in the workplace, the form for recording responses is generic.

2. Please make reasonable adjustments to the form as required to accommodate particular aspects of individual Competency Standard Units.

Level 1 - Appropriate Coverage of Responses to Questions

Element 1 – Planning for job/task functions (L1)

Issues about involvement of personnel, enterprises operational requirements and the requirements of regulators would not normally be expected.

Coverage should involve such things as:

OHS:

- Clarifying instructions given if any doubt exists as to what is required.
- Checking with others involved if any personal protective equipment is needed.
- Identifying hazards and risks associated with the work, including any first aid and other similar requirements

Tools, equipment etc:

- Identifying the tools and equipment that are required.
- Explaining where any special equipment is located and how arrangements will be made to have them available, if required.

The Work Schedule:

- Identifying the work and relevant processes, procedures and personnel required.
- Identifying the process of work to be undertaken.
- Identifying the work site activities and issues to be attended to.
- Identifying the authorities associated with the work.
- Identifying any isolation procedures/permits that may apply.

Element 2 – Carrying out job/task functions (L1)

Coverage should involve such things as:

OHS:

- Keeping the immediate work area clear of debris.
- Keeping tools clean and organised when not in use.
- Keeping clear of such things as moving parts, live electrical conductors, hazards, and obstacles.
- Wearing work clothes and personal protective equipment when required.
- Performing the technical work required.
- Applying the relevant knowledge and skills underpinning performance.

Tasks:

- Following instructions given by others.
- Observing what is occurring, listening to explanations about why tasks are

performed in certain ways and asking questions when required.

Element 3 – Completing job/task functions (L1)

Coverage should involve such things as:

- Cleaning tools and equipment.
- Returning tools and equipment to their normal storage place.

Level 2 - Appropriate Coverage of Responses to Questions

Element 1 – Planning for job/task functions (L2)

Coverage should involve, but not limited to, such things as:

OHS:

- Clarifying instructions given if any doubt exists as to what is required.
- Arranging for any special personal protective equipment to be available.
- Checking to see if the work site is accessible.

Personnel:

- Identifying other personnel involved in the work and coordinating proposed activities.

Regulatory requirements:

- Arranging for relevant work instructions and installation specifications to be available, if required.
- Arranging work permits/isolation, etc.

Tools, equipment etc:

- Arranging the tools and equipment that are required.
- Coordinating where any special equipment is located and how arrangements will be made to have them available, if required.

The Work Schedule:

- Confirming the plan and process of work to be undertaken.
- Confirming the work and relevant processes, procedures and personnel required.
- Confirming the work site activities and issues to be attended to.
- Confirming the authorities associated with the work.
- Confirming isolation or work permits authorities.

Element 2 – Carrying out job/task functions (L2)

Coverage should involve, but not limited to, such things as:

OHS:

- Keeping the immediate work area clear of debris.
- Keeping tools clean and organised when not in use.
- Keeping clear of such things as moving parts, live electrical conductors and obstacles.
- Wearing work clothes and personal protective equipment when required.
- Having barriers in place to exclude public access to the work place, as required.
- Ensuring all personnel involved are alerted to work activities and communications are established and maintained.
- Keeping alert to the working environment while watching for unexpected occurrences.
- Confirming appropriate competence of first aid and persons, including other requirements such as confined space and the like, where appropriate.

Engineering tasks – specific actions should be included that are additional to the following:

- Performing tasks independently with reference to enterprise instructions.
- Accept and act on initial advice and feedback provided by others.
- Observing what is occurring, listening to explanations about why tasks are performed in certain ways and asking questions when required.
- Applying essential knowledge and associated skills and providing solutions to "what if" scenarios.

Technical assistance:

- Further reference to enterprise instructions.
- Reference to the requirements of regulations, work instructions or other relevant standard.
- Recall of theory or application.
- Involvement of others with greater experience.

Element 3 – Completing job/task functions (L2)

Coverage should involve, but not limited to, such things as:

Performance checks:

- Checking that all guards & covers removed during the activities are replaced & adjusted.
- Check that all temporary arrangements required during the process work have been removed.
- Carrying out any tests required by regulation or work instructions.
- Operating the installed/repared parts or system to ensure it functions as specified.

Notification:

- Informing all immediate personnel involved that the work is completed.
- Informing clients and others that the work is completed.
- Removing all signs and barriers, as necessary.

Element 3 – Completing job/task functions (L2)

- Reporting any damaged tools and equipment and arrange replacement.

Paperwork:

- Completing store/inventory paperwork.
- Completing the work log or management reports precisely by recording what occurred and providing recommendations/solutions to be followed up in point form.

Instruction for Recording Responses to Questions**Step 1**

Identify the elements of competence on which questions will be asked.

Step 2

Identify if the response expected is to be typical of a candidate who undergoing a formative assessment (level 1) or summative assessment (level 2). This may be different for each element involved.

Step 3

Ask the main question and indicate (Y or N) whether the candidate's response addresses the coverage required.

Step 4

Ask follow up questions to probe any areas not recorded as Y in Step 3. Record Y or N to the response given in the space provided.

From all the evidence presented a holistic judgement is then made.

Questions

Unit Title:

No.

Candidate's name:

Assessors name:

Main Question for the 'Planning Work' Element

What are the main things you would

Expected Response Level

Not used

(circle)

1

2

(tick)

Unit Title:						
No.						
Candidate's name:						
Assessors name:						
<i>consider when you are planning and preparing for work?</i>						
Issues to be cover in response to the main question – and – Follow up questions, if required					Coverage (Y or N)	
What occupational health and safety issues do you consider?						
Who are the personnel you would involve?						
What enterprise requirements need to be taken into account?						
What regulatory requirements need to be taken into account?						
What tools, equipment and other items need to be arranged to do this job, where will you get them from and how will you arrange to have them made available when you need them?						
What work schedule will be followed?						
Main Question for the 'Carry-Out Work' Element		Expected Response Level			Not used	
What are the main things you will do		(circle)	1	2	(tick)	

Unit Title:	
No.	
Candidate's name:	
Assessors name:	
<i>to ensure the work you carry out is done productively?</i>	
Issues to be cover in response to the main question – and - Follow up questions, if required	Coverage (Y or N)
What are the main OHS practices and precautions that are specific to this work function?	
What are the main engineering tasks involved in carrying out this job?	
What would you do if the work you were undertaking became technically difficult and you could not complete it to requirements?	
What essential knowledge and associated skills would support a response to providing solutions to "what if" scenarios?	

Unit Title: (Cont.)					
No.					
Main Question for the 'Completing Work' Element What are the main things you will do What are the main things you will do	Expected Response Level			Not used	
	(circle)	1	2	(tick)	

Unit Title: (Cont.)	
No.	
<i>What needs to be done to finalise the job?</i>	
Issues to be cover in response to the main question – and – Follow up questions, if required	Coverage (Y or N)
What checks need to be made to insure the work you undertook meets specified performance requirements?	
Who do you notify that the work has been completed?	
What paperwork needs to be completed and what will you write about?	

Enclosure A9 — Practical Demonstration

As part of evidence provided to demonstrate competence against detailed competency standards, you, the assessor, may need to observe the candidate demonstrating practical tasks. The Engineering Practical Skills Form is provided here to help assessors record these work-based observations. The notes taken are analysed and from this a rating is given for the candidates engineering skills.

Note to assessors:

- The form for recording responses is generic to all Competency Standard Units.
- Make reasonable adjustments to the form as required to accommodate particular aspects of individual Competency Standard Units.
- You may only need to observe candidates on particular (not all) elements of competence.
- If the assessment is formative (for feedback purposes), then the level of supervision that applies during work activities should apply during the assessment activity.

Instructions for Completing the Engineering Practical Skills Form

The form provides a means of recording information about a learner's engineering practice. A workplace assessor (or nominee) does this by an observation of pre-arranged activities and determining an engineering skills rating.

Step 1

Enter the title of the Competency Standard Unit and the Unit Number in the space provided.

Step 2

Enter the learner's name in the space provided.

Step 3

Enter the name of the person who is completing the form (this may be the assessor or someone who the assessor nominates to gather the information).

Step 4

Enter the date on which the evidence is gathered.

Step 5

Determine the elements of competence being observed (circle yes or no).

Step 6

Determine the level of supervision that is to apply to the Elements being observed. Use the Supervision Level code from the bottom left of the form (A, B or C) and enter in the second column.

Step 7

Observe the learner perform tasks related to the element(s) being assessed, checking that they address the required Performance Criteria. Record in the first column of the table under the heading 'Notes from Observation' key points to indicate whether the learner:
Has acted in a way that meets specifications required by manufacturers, regulations or client specifications.

- Has followed established enterprise procedures.
- Met the requirements of the Competency Standard being assessed.
- Needed to be shown or told how to perform tasks beyond what is reasonably expected given his/her level of experience and therefore requires further training.

Step 8

Using the Engineering Skills Rating codes at the bottom right of the table, enter the appropriate letter in the space provided to indicate the level of competence demonstrated in relation to the Competency Standard being assessed.
From all the evidence presented a holistic judgement is then made.

Engineering Practical Skills Form		
Competency Standard Unit title: _____	Date: ____/____/____	
<i>Candidate's name:</i> _____	<i>Assessor's Name:</i> _____	
Notes from observation	Supervision Enter A, B or C	Engineering Practice Enter D, E, F, G
<i>Plan activities:</i> Yes or No (circle to indicate if evidence is being gathered)		
<i>Carry out activities:</i> Yes or No (circle to indicate if evidence is being gathered)		
<i>Complete activities:</i> Yes or No (circle to indicate if evidence is being gathered)		
Supervision - Level		Engineering Skills - Rating
A	The learner is working under direct supervision.	D
B	The learner is working under limited supervision	E
C	The learner is working under general supervision with a high degree of autonomy	F
Learner's Signature		G
Assessor's Signature		Further training required

Enclosure A10 — Final/Challenge Test

A test may be required if the assessment process does not provide:

- sufficient, authentic or current evidence
- particular aspects of evidence related to equipment operation
- particular aspects related to safety
- all the requirements related to the influence of external bodies such as regulatory authorities

A final test should:

- cover the conditions associated with the 'Critical Aspects of Evidence' statement in Competency Standard Units
- take into account the principles of assessment and be sufficiently rigorous
- be consistent with the policies and practices of the Registered Training Organisation who is providing the recognition.

Enclosure A11 — Contracted Entry Level Profiling Model — Sample assessment instruments that support a profiling model

In relation to the industry preferred assessment model for contract entry-level competency development programs (Australian Apprenticeships), longitudinal approaches to assessment activities are considered more efficient and effective. This is best achieved by implementing a process of frequently gathering reliable data from the workplace by the learner and having it verified in a form that can be easily used and consistently interpreted.

One option is to use a machine-readable data scan card or direct web entry process, operating in conjunction with a sophisticated computer software program to achieve this result. The design of the system known as Profiling reflects the key requirements outlined in the relevant Competency Standard Units making up the competency development plan/program. Learners report directly on their exposure to required work experiences in a structured way. Additional to the off-the-job technical training required for contracted entry level learners Profiling gathers specific workplace information reliably and systematically.

Data gathered frequently from the workplace accumulates over the competency development period and is reported graphically at given periods. This approach encourages self review and participation in the system and eliminates bias and minimises the effects of low levels of literacy (see over the page for an example).

The information gathered under Profiling, forms one component of a two part, in some cases three part, Training Program that supports competency development in a way preferred by the industry. The components are:

- off-the-job training (technical subjects/topics), and
- on-the-job training (workplace activities), and
- a specific final "safety systems (capstone)" test, where applicable

Typically, the off-the-job component requires the successful completion of technical subjects/topics of training against essential knowledge and associated skills (EKAS) clauses included in the respective Competency Standard Units. More often than not the EKAS are aligned to EKAS Learning Specifications that expand on the essential knowledge and associated skills clauses; providing more detailed information on depth and breadth of learning required, for RTOs. The on-the-job component requires a profile to develop from workplace experiences/exposures. Finally, a specific safety assessment test is conducted, where applicable, for regulatory and industry requirements.

In relation to the on-the-job workplace data (experiences/exposures) is gathered and reported on against the respective aspects of industry determined competency standards, using predefined industry norms. Typically the information gathered pertains to the:

- activity against each element of competency and indirect information against the performance criteria
- quality, breadth and range of equipment, processes, techniques and applications experienced and worked with/on in the workplace
- level of supervision of a learner's workplace experiences
- hours of exposure (recording hours only is not generally considered Profiling)

Entry against the prescribed criteria is completed regularly (e.g. weekly) by the learner, the software program calculates the data against industry predefined norms and regular reports are produced (typically quarterly) for the use and information of RTOs, employers and the learner. Assessors use this information in a holistic way to identify and analyse trends and anomalies against the predefined industry norms.

The advantage of Profiling over many other mediums such as manually based log-books which require extensive and laborious analysis is that it is simple and directly reflective of the workplace experiences undertaken at the time. It provides evidence for:

- managing workplace skill development/ performance of competency required to produce quality work
- progressive assessment and supporting the attainment of a national qualification
- the attainment of an electrical workers' licence/regulated registrations, where appropriate
- the need for job rotation
- allocating work
- RTOs — in this way reducing the demand for an array of workplace assessors.

To gain an appreciation of what a data card and a report may look like a sample of each is included over the page.

Sample Data Card and Quarterly Report– Provided over the page

Note: details of fields determined by Industry to accommodate enterprise requirements

Sample Data Card

Certificate III Electrotechnology Systems Electrician

Week Number

Profiling Registration No.

Apprentice Surname

Apprentice Signature

SAMPLE ONLY

Main activity grid with columns for various tasks like 'Install support / protection', 'Test Apparatus / circuits', etc., and rows for 'This week I:', 'worked in the these areas', 'planned', 'carried out', 'completed', 'whilst under', 'Cable/wiring support protection', 'Power and control - LV cables', 'Network communications cables', 'Mandatory testing', 'Other testing', and 'Supporting work included'.

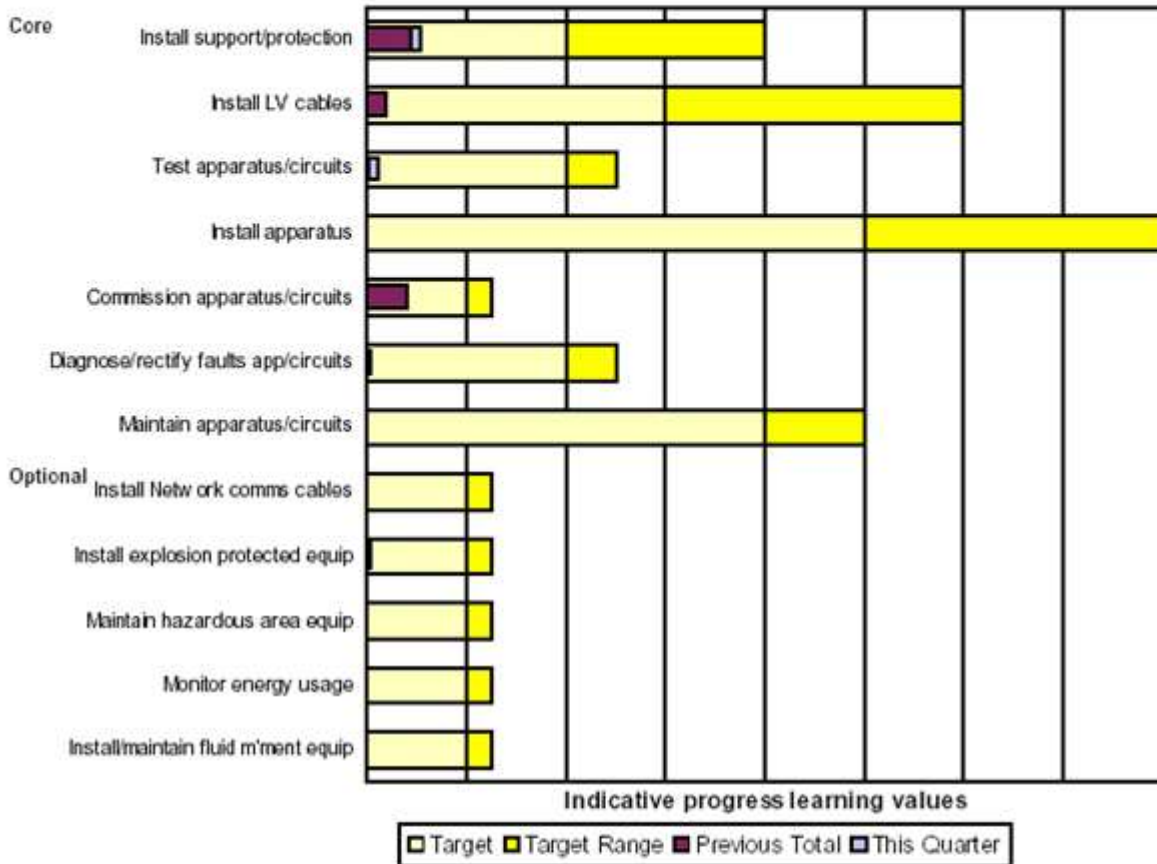
Tradesperson's signature verifies that the work was performed to an acceptable standard within an acceptable timeframe given the experience of the apprentice. Electrical Licence No., Tradesperson's Surname, Tradesperson's Signature.

N.B. Both the Tradesperson's signature and Licence Number on the bottom of the card are mandatory - your signature means that you are simply checking that the work listed has been done. You are not assessing competency. There is no greater responsibility/obligation placed on the Tradesperson signing this card than there is currently under the Apprenticeship Act

Sample Profiling Report

First Zzsample (999999)

**Apprentice On Job Experience Profile - Progressive and Benchmarks Points
Systems Electrician - Quarterly Report, May 2002**



* indicates Optional competency selected by the learner in Schedule C

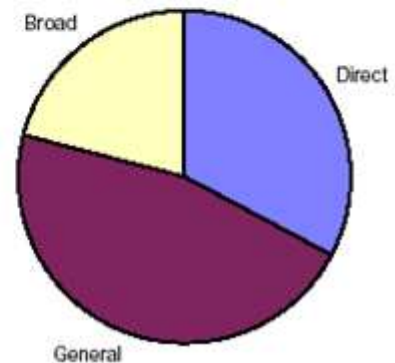
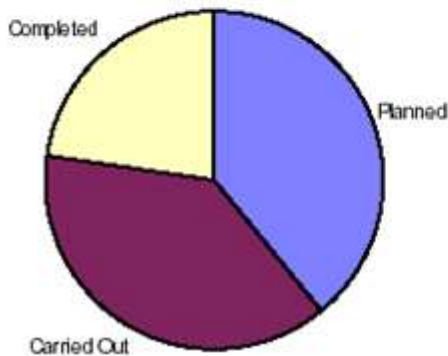
Apprentice Signature Date

Employer Signature Date

Host Signature (if applicable) Date

Apprentice role

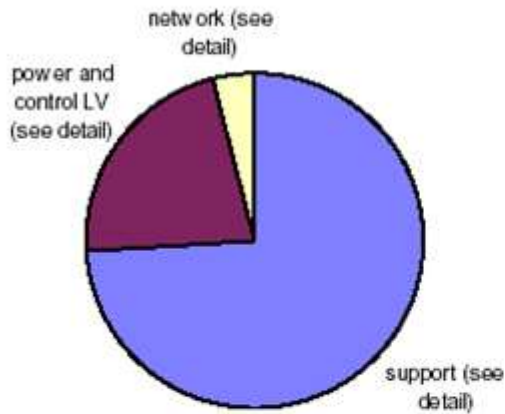
Supervision level



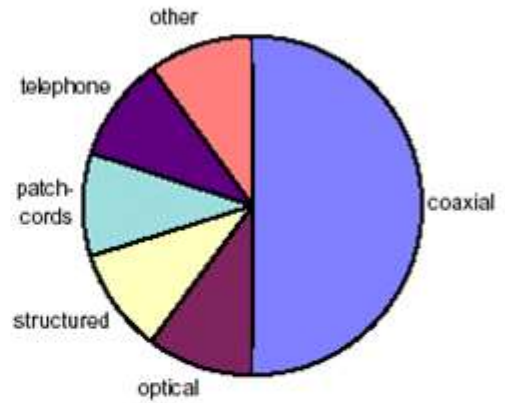
Sample Profiling Report (cont.)

First Zzsample (999999)

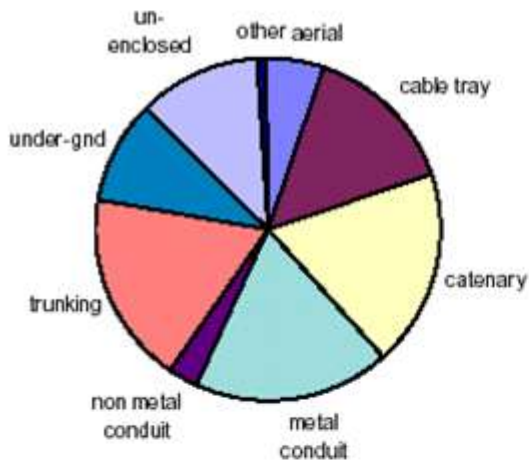
Electrical wiring system type



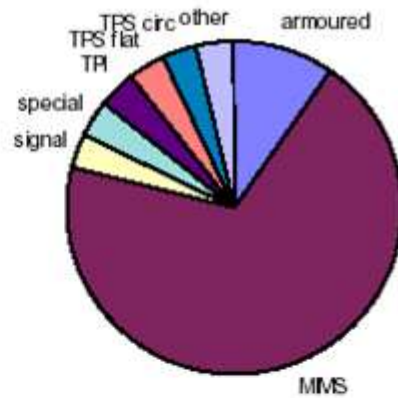
Electrical wiring detail: Network communications



Electrical wiring detail: Support and protection



Electrical wiring detail: Power & control - LV



Testing techniques used



Enclosure B: Administrative forms

Enclosure B1	Notification of workplace assessment
Enclosure B2	Application for recognition of prior learning/ current competence
Enclosure B3	Assessee comment/feedback
Enclosure B4	Candidates competency achievement report to a Registered Training Organisation

Enclosure B1 — Notification of workplace assessment

This form is used to notify a learner about their assessment. The learner is advised of the type of evidence being sought, the Competency Standard Unit(s) of competence being considered, who will be involved and the time and place of the activity.

Enclosure B2 — Application for recognition of prior learning/ current competence

Candidates should use this form to apply for recognition. The applicant needs to provide their personal details, the Competency Standard Unit(s) for which they seek recognition, the type of evidence being provided and the names of referees.

Enclosure B3 — Assessee comment/feedback

This form is used by the learner (or RPL applicant) to make comments about the workplace assessment process and/or decision. It should be distributed prior to an assessment event being conducted. The workplace assessor should be sent a copy of each form completed and should retain completed forms in case of any future review and/or inquiry.

Enclosure B4 — Candidates competency achievement report to an RTO

This form summaries a workplace assessment process and allows workplace assessors to make recommendations to an RTO about deeming competence of a learner or RPL applicant.

Enclosure B1 — Notification of a Workplace Assessment

Learners Name: _____ **Date of notification:** / /

Assessors Name: _____ **Tel:** _____

Qualification Title: _____

The workplace assessment will be carried out on the following Competency standard units		For the following reason (tick)	
Unit No.	Unit Title	Advice	Completion

Location _____ **Date:** / / **Time:** _____

Information has already been gathered from or is to be gathered from the following sources indicated below.

No	Source of Information	Already Gathered (tick)	To be Gathered (tick)
1	Work Activity Records - experiences mostly relate to re-occurring workplace events.	Paper Based	
		Electronic	

2	Technical Results (i.e. modules) – part of the program that develops your technical knowledge and skill		
3	Portfolio – personal and academic detail, employment and work achievements, references and the like		
4	Self Analysis – provides guidance on the type of evidence required and guides reference to other information		
5	Item Range - list of components, tools, systems, plant, test equipment, etc on which experience is gained		
6	Supervisor’s Report - general comments about applying technical skills, being safe and productive		
7	Soft Skills Report - your ability to follow instructions, deal with clients and work in teams		
8	Questioning - covers issues related to your performance when planning, carrying out and completing work		
9	Practical Demonstration - a demonstration of your ability to perform tasks in a actual or simulated situation		
10	Final Test – evidence related to critical aspects of what is required by you to demonstrate competence		
11	Other (list)		

Note: Once all the information is collected and the data analysed the results about your progress towards or achievement of competence will be forwarded to you for your comments. If you require any additional information you should contact the assessor (above telephone number) or your nominated supervisor/mentor.

Name _____ Signature _____

Enclosure B2 — Application for Recognition of Prior Learning/ Current Competence

Name: _____ Date of Birth: / /

Address: _____

Telephone: _____ Mobile _____ e-mail _____

Recognition Sought _____

Training Package _____

Qualification No. and Title _____

Competency Standard Units (Candidate to List)

Unit Title	Unit No.

Evidence Provided

Type	Tick if Attached
Certificates	
Curriculum Vitae	
Transcript of Academic Record – modules completed/equivalent	
References	
(other)	

Referees

Name	Organisation and Title of Referees	Contact Number of Referees

Candidate's Signature: _____ Date: / /

Enclosure B3 — Assessee comment/feedback

To be completed by the candidate following an assessment event

Location: _____ **Date:** ___/___/___ **Time:** _____

Assessor's Name: _____

Please complete the following and return it to the Assessor.

Candidates' Name: _____

Contact N°: _____

I have read the Final Report for this assessment event and,
(tick)

Agree with the outcome

or

Disagree with the outcome

Comments:

Candidate's Signature: _____ **Date:** ___/___/___

Enclosure B4 — Candidates competency achievement report to RTO

This recommendation is made to (enter RTO name) _____

It is recommended that (learner's name) _____ (contact and identification details) _____

_____ be attributed competence in the following Competency standard units.

These Units are from the Qualification (Title and No.)

Unit No.	Competency standard unit Title	Assessors Initials

The recommendation was made based on analysed evidence taken from the following sources	Tick
Work Activity Records	
Module (Learning Specification) Results	
Portfolio	
Self Analysis	
Item Range – Learner’s Report	
Supervisor’s Report	
Soft Skills Report	
Questioning	
Practical Demonstration	
Final Test	
Other (enter)	

Statement

The recommendation to attribute competence to the above mentioned individual is based on the evidence requirements outlined in Competency Standard Units from the _____ (Enter the

Number and Title of the Training Package.)

Assessor's Name _____

Signature _____ **Date:** / /

Enclosure C: Glossary of Terms

Definitions of all terms used in this section are set out below.

Term	Definition/Explanation
Appeal process	A process whereby the person being assessed or other interested party, such as an employer, may dispute the outcome of an assessment and seek reassessment.
Assessment	The process of collecting evidence and making judgements on whether competency has been achieved to confirm that an individual can perform to the standard expected in the workplace as expressed

Term	Definition/Explanation
	in the relevant endorsed industry/enterprise competency standards or outcomes of accredited courses.
Assessment context	The environment in which the assessment will be carried out. This will include physical and operational factors, the assessment system within which assessment is carried out, opportunities for gathering evidence in a number of situations, the purpose of the assessment, who carries out the assessment and the period of time during which it takes place.
Assessment guidelines	Assessment guidelines are the endorsed component of a Training Package which underpins assessment and which sets out the industry approach to valid, reliable, flexible and fair assessment. Assessment guidelines include the assessment system overview, assessor requirements, designing assessment resources, conducting assessment and sources of information on assessment.
Assessment judgement	Assessment judgement involves the assessor evaluating whether the evidence gathered is valid and authentic, and whether there is sufficient and reliable evidence to make the assessment decision. The assessment judgement will involve the assessor in using professional judgement in evaluating the evidence available.
Assessment materials	Assessment materials are any resources that assist in any part of the assessment process. They may include information for the candidate, assessment tools or resources for the quality assurance arrangements of the assessment system.
Assessment plan	An assessment plan is a document developed by an assessor that includes the elements and Competency Standard Units to be assessed, when the assessment will occur, how the assessment will occur, the assessment methods to be used and the criteria for the assessment decision.
Assessment process	The assessment process is the agreed series of steps that the candidate undertakes within the enrolment, assessment, recording and reporting cycle. The process must suit the needs of all stakeholders and be both efficient and cost-effective. The agreed assessment process is often

Term	Definition/Explanation
	expressed as a flow chart.
Assessment strategy	Assessment strategy means the approach to assessment and evidence gathering used by the assessor or RTO. It encompasses the assessment process, methods and assessment tools.
Assessment system	An assessment system is a controlled and ordered process designed to ensure that assessment decisions made in relation to many individuals, by many assessors, in many situations are consistent, fair, valid and reliable.
Assessment tool	<p>An assessment tool contains both the instrument and the instructions for gathering and interpreting evidence:</p> <ul style="list-style-type: none"> • Instrument[s] — the specific questions or activity developed from the selected assessment method[s] to be used for the assessment. A profile of acceptable performance and the decision making rules for the assessor may also be included. • Procedures — the information/instructions given to the candidate and/or the assessor regarding conditions under which the assessment should be conducted and recorded.
Candidate	<p>A candidate is any person presenting for assessment. The candidate may be:</p> <ul style="list-style-type: none"> • a learner undertaking training in an institutional setting • a learner/worker undertaking training in a workplace • an experienced worker wanting their skills recognised • any combination of the above.
Competency	The specification of knowledge and skill and the application of that knowledge and skill to the standards of performance required in the workplace.
Competency standard	Competency standards define the competencies required for effective performance in the workplace. Standards are expressed in outcome terms and have a standard format comprising of Unit title, Unit descriptor, Elements of Competency, Performance Criteria, Range Statement and Evidence Guide. See also Unit[s] of Competency.

Term	Definition/Explanation
Competency standard unit	Also see Unit of Competency
Critical aspects of competency	A statement in a Unit of Competency that provides clear meaning as to what is to be achieved in the assessment process.
Currency of evidence	Evidence that is relevant to what is outlined in competency units and not outdated or irrelevant.
Dimensions of competency	<p>The concept of competency includes all aspects of work performance and not only narrow task skills. The four components of competency are:</p> <ul style="list-style-type: none"> • task skills • task management skills • contingency management skills • job/role environment skills.
Electronic Profiling	<p>An innovative electronic based logbook system used by apprentices to record, and report on their workplace activities. A specially designed data entry card is used to capture work experiences (e.g. weekly) against industry approved competency standards and reported against industry-defined benchmarks. <i>See</i> Section 3.5 Assessment Processes within the Electrotechnology Industry and section Appendix A — Enclosure A11 Contracted entry level Profiling Model.</p>
Element of Competency	<p>The basic building block of the Competency Standard Unit. Elements describe the tasks that make up the broader function or job described by the unit.</p>
Essential Knowledge and Associated Skills clauses	<p>EKAS clauses provide the content specifications that must be achieved by learners in terms of the body of essential knowledge and associated skills.</p>
Essential	<p>EKAS learning specification is specific learning content that is</p>

Term	Definition/Explanation
Knowledge and Associated Skills learning specification	<p>complete in itself and expands on the Competency Standard Units EKAS clauses in terms of depth and breath. It may underpin many, few or one Competency Standard Unit(s). It covers one or more aspects of knowledge and skills. An EKAS LS can be separately delivered and assessed with percentage achievement reporting, and may be linked with other EKAS LSs for delivery purposes in the same discipline area.</p>
Evidence / quality evidence	<p>Evidence is information gathered which, when matched against the performance criteria, provides proof of competency. Evidence can take many forms and be gathered from a number of sources. Assessors often categorise evidence in different ways for example:</p> <ul style="list-style-type: none"> • direct, indirect and supplementary sources of evidence • evidence collected by the candidate or evidence collected by the assessor • historical and recent evidence collected by the candidate and current evidence collected by the assessor. <p>Quality evidence is valid, authentic, sufficient and current. It enables the assessor to make the assessment judgement.</p>
Evidence gathering techniques	<p>Evidence gathering technique means the particular technique or method used to gather different types of evidence. This may include methods or techniques such as questioning, observation, third party reports, interviews, simulations and portfolios.</p>
Evidence Guide	<p>Evidence Guide is part of a Competency Standard Unit. Its purpose is to guide assessment of the unit in the workplace and/or a training environment. The Evidence Guide specifies the context of assessment, the critical aspects of evidence and the required or underpinning knowledge and skills. The Evidence Guide relates directly to the Performance Criteria and Range Statement defined in the Competency Standard Unit.</p>
Fairness	<p>See section 3.4.1 Assessment Principles</p>
Flexibility	<p>See section 3.4.1 Assessment Principles</p>

Term	Definition/Explanation
Holistic / integrated assessment	An approach to assessment that covers the clustering of multiple units/elements from relevant competency standards. This approach focuses on the assessment of a ‘whole of job’ role or function that draws on a number of units/elements of competence. This assessment approach also integrates the assessment of the application of knowledge, technical skills, problem solving and demonstration of attitudes and ethics.
Industry Skills Council/Industry Training Advisory Bodies (ITABs)	National bodies comprising representation from the industry parties responsible for the development, review, implementation, and providing advice on qualifications scopes and competency standards in given industries.
Module	A specific learning segment that is complete in itself. It deals with one or more aspects of knowledge and skills. A module is separately delivered and assessed and may be linked with other modules in the same study area and aligned to a competency standard unit(s).
Australian Apprenticeship Centre	An organisation who provides information on apprenticeships, traineeships and the related qualifications and processes.
Portfolio	See section 3.5 Assessment Processes in the Electrotechnology Industry.
Profiling	See section 3.5 Assessment Processes in the Electrotechnology Industry.
Performance Criteria	Evaluative statements which specify what is to be assessed and the required level of performance. The Performance Criteria specify the activities, skills, knowledge and understanding that provide evidence of competent performance for each Element Of Competency.
Qualification	Qualification means, in the vocational education and training sector, the formal certification, issued by a Registered Training Organisation under the Australian Qualifications Framework, that a person has achieved all the requirements for a qualification as specified in an endorsed Training Package or in an Australian Qualifications

Term	Definition/Explanation
	Framework accredited course where no relevant Training Package exists.
Range Statement	Part of a competency standard, which sets out a range of contexts in which performance can take place. The range helps the assessor to identify the specific industry or enterprise application of the Competency Standard Unit.
Reasonable adjustment	The nature and range of adjustment to an assessment tool or assessment method which will ensure valid and reliable assessment decisions but also meet the characteristics and background of the person(s) being assessed.
Recognition [Recognition of Prior Learning, Recognition of Current Competency and Skills Recognition]	Recognition is a term that covers Recognition of Prior Learning, Recognition of Current Competency and Skills Recognition. All terms refer to recognition of competencies currently held, regardless of how, when or where the learning occurred. Under the Australian Recognition Framework, competencies may be attained in a number of ways. This includes through any combination of formal or informal training and education, work experience or general life experience. In order to grant recognition of prior learning/current competency the assessor must be confident that the candidate can present evidence that he or she is currently competent against the endorsed industry or enterprise competency standards or outcomes specified in Australian Recognition Framework accredited courses. The evidence may take a variety of forms and could include certification, references from past employers, testimonials from clients and work samples. The assessor must ensure that the evidence is authentic, valid, reliable, current and sufficient.
Records of assessment	The information of assessment outcomes that is retained by the Organisation that is responsible for issuing the nationally recognised Statement of Attainment or qualification.
Registered Training Organisation (RTO)	Registered Training Organisation (RTO) means a training organisation registered in accordance with the Australian Recognition Framework, within a defined scope of registration (refer definition Scope of Registration).

Term	Definition/Explanation
Reliability	See section 3.4.1 Assessment Principles
Sampling	See section 3.5 Assessment Processes in the Electrotechnology Industry.
Statement of Attainment	Statement of Attainment means a record of learning, recognised under the AQF, which although falling short of an AQF qualification, may contribute towards a qualification outcome, either as attainment of competencies within a Training Package, partial completion of an AQF accredited course leading to a qualification, or completion of a nationally accredited short course which may accumulate towards a qualification through Recognition of Prior Learning processes.
Sufficiency of evidence	See section 3.4.3 Assessment Judgments
Training Package	Training Package means an integrated set of nationally endorsed competency standards, assessment guidelines and Australian Qualifications Framework qualifications for a specific industry, industry sector or enterprise.
Training Agreement	An agreement outlining the training and assessment which forms part of an Australian Apprenticeship Training Contract and is registered with the relevant State or Territory Training Authority.
Training Plan	Training Plan means a program of training and assessment which forms part of an Australian Apprenticeship/traineeship Training Contract and is registered with the relevant State or Territory Training Authority.
Transcript of results — statement	List of candidate's modules/subjects/ EKAS learning specifications completed as part of a Competency Standard Unit(s) or qualification.
Unit(s) of Competency / Competency	Competency Standard Unit means the specification of knowledge and skill and the application of that knowledge and skill to the standard of performance required in the workplace. Competency Standard Units

Term	Definition/Explanation
standard units	define the outcomes for training delivery and assessment and lead to the issuing of Australian Qualifications Framework qualifications and Statements of Attainment. See also <i>Competency Standard</i> .
Validity	See section 3.4.1 Assessment Principles
Validation	Validation involves reviewing, comparing and evaluating assessment processes, tools and evidence contributing to judgements made by a range of assessors against the same standards. Validation strategies may be internal processes with stakeholder involvement or external validations with other providers and/or stakeholders.

2.1 Preliminary Information and Glossaries

Preliminary Information

Qualifications and Competency Standard Units in this Training Package are found within Volume 1 and Volume 2. The parts however must all be read in conjunction with each other for the purposes of developing learning and assessment resources. Users should refer to Volume 1, Part 1 for Qualification Frameworks and structures.

The Competency Standard Units for the Electricity Supply Industry (ESI) Transmission, Distribution and Rail sectors are found in Volume 2, Part 2. To fully apply the Competency Standard Units, other relevant parts of the Training Package must be applied as well. These are the:

- Glossary of ESI Terms (Volume 2, Part 1)
- Essential Knowledge and Associated Skills (Volume 2, Part 2)

The Definitions/Glossary of Terms is a major section of the Electricity Supply Industry (ESI) Training Package and is to be used in conjunction with the Competency Standard Units. Section 7 of each Competency Standard Unit lists a range of variables — the Range Statement. These, as well as other Electricity Supply Industry (ESI) terms, are explained in the Glossary of Terms.

In addition, the National Occupational Health and Safety Commission Glossary of Terms has been included. Users will find definitions here that clarify any Occupational Health and Safety specific terms. Where a term in the glossary is followed by a number, e.g. *Tools and equipment (2)*, the number indicates the AQF level.

Volume 2, Part 2 contains Competency Standard Units and the Essential Knowledge and Associated Skills (EKAS). The Competency Standard Units refer to the Knowledge and Associated Skills in the respective section of each Competency Standard Unit. As with the Definitions/Glossary, users should apply the requirements found in the Essential Knowledge and Associated Skills section for an outline of what is defined.

The Essential Knowledge and Associated Skills are detailed separately from the Competency Standard Units make the package easier to interpret and apply. Each Competency Standard Unit has listed within its Essential Knowledge and Associated Skills section a unique clause number and title. Further specific information to be covered is elaborated in Volume 2, Part 2.2.1. This separate Essential Knowledge and Associated Skills forms an integral part of each Competency Standard Unit, and all assessment evidence activities and reporting processes are to incorporate this specification.

1.1 Definitions/Glossary

Scope

The Competency Standard Unit described in this Part of the Training Package covers Competency Standard Units for the ESI – Transmission, Distribution and Rail sector. The terms are not to be considered a definitive list but should give a clearer understanding of the meaning of the term and the range of a Unit of Competency in which the term is contained. These terminologies do not necessarily reside in States/Territories and can vary between States/Territories.

Application

The information contained in each Competency Standard Unit includes the intended use of the unit for assessment and a training program(s).

Regulations

The work functions described by Competency Standard Units in this Training Package may be subject to statutory regulations. Where this is the case the particular regulations will depend on local jurisdictions and knowledge, and application of such regulations within the scope of the unit will be an aspect of evidence in deeming a person competent.

Reference documents

Each part of the Training Package will include a list of reference documents. These are a component of competency, which assist in developing training programs, and assessing competency. Reference documents include relevant legislation, regulation, industrial instruments, codes of practice, guidelines and advisory standards and policies. Examples may include industry preferred training and assessment models, anti-discrimination and equal employment opportunity statutes encompassing application of access, equity and cultural diversity principles associated with under-represented groups.

Definitions of ESI – Transmission, Distribution and Rail Sector Terms

The definitions of terms form an integral part of respective parts of this Training Package.

Term	Definition/Explanation
Analyse	To examine and investigate data on information
Anchor	Rail traction specific term. Has the catenary and/or contact wire/trolley wire anchored to it, which is secured by guys or specially designed to withstand the load of the wires.
Anchor arrangement	Rail traction specific term. Equipment used to terminate and tension conductors. Includes anchor guy arrangements.
Appropriate and relevant persons (see Personnel)	Organisation employees, contractors, consultants, maintenance persons, appropriately experienced and qualified persons, drivers, cleaners, grounds and site security persons, other managers, other supervisors, inter-company departments, other utilities, council representatives, producers, transporters/shippers, consultants, government bodies/agencies, refinery persons, customers, land owners.
Access Authority	Means any form of authorisation, which allows access to work on or near, or for the testing of, apparatus. Refer to NENS 03-2003
Appropriate authorities	May include local councils; road authority; sewage and stormwater authorities; providers of service such as electricity, water and telephones.
Appropriate work platform	Work may be performed from elevating work platform, ladder, portable pole platform, ground or structures.

Term	Definition/Explanation
AQF	Australian Qualifications Framework which describes qualifications in terms of levels characterised by the outcomes of vocational education and training.
Arrangements for dealing with emergency situations	Procedures for dealing with emergency or hazardous situations include evacuation, chemical containment and first aid procedures. Hazardous events include accidents, fire and emergencies such as chemical spills or bomb scares.
Assessing risk	Determining the likelihood and severity of adverse consequences from hazards by means of OHS audits; workplace inspections; maintenance of plant and equipment; purchasing of materials and equipment; planning or implementing alterations to site, operations or work systems; and analysis of relevant records and reports, e.g. injuries and incidents, hazardous substances inventories/registers, audit and environmental monitoring reports and OHS committee records. It also includes hazard and incident reports; workplace inspections; consulting work team members; housekeeping; daily informal team consultation and regular formal team meetings; internal and external audits; industry information such as journal, newsletters and networking.
Assessment	Refers to the process of collecting evidence and making judgements on the extent and nature of progress towards the performance requirements set out in a standard and at the appropriate point making the judgement whether competency has been achieved.
Authorisation	Responsibility assigned for the application of relevant management practices to approve measures according to company policies, procedures and processes, legislative and/or regulatory requirements.
Auxiliary feeder/Side Feeder	Rail traction specific term. Feeder conductors that provide for additional current carrying capacity to the overhead wiring.
Cable	A single cable core, or two or more cable cores laid up together, either with or without filings, reinforcements, or protective coverings. Refer to AS/NZS 3000:2000
Cantilever	Rail traction specific term. Rectangular or triangular shaped frames/assemblies consisting of tubes, chains and other hardware to support and register the catenary and contact wires.

Term	Definition/Explanation
Cantilever mast	Rail traction specific term. A mast which supports the tubes, chains and other cantilever components.
Cardiopulmonary Resuscitation (CPR)	CPR (cardiopulmonary resuscitation) — an emergency life-support procedure using a combination of expired air resuscitation and external cardiac compression.
Catenary wire	Rail traction specific term. Multi-stranded copper/steel/aluminium conductor located above the contact wire. It supports the contact wire(s) via droppers.
Circuit breaker	A switch suitable for opening a circuit automatically, as a result of predetermined conditions, such as those of overcurrent or undervoltage, or by some form of external control. Refer to AS/NZS 3000:2000
Communication equipment.	Equipment may include: Fixed radio; Mobile radio; Satellite; SACS controllers; Computer hardware and software; Programmable controllers; Modems; Digital line drivers (low and high speed); Fibre optic line drivers (low and high speed); Radio links including voice link and digital bearer; Wave trap.
Competency Standard Unit(s) see also Unit(s) of competency	Competency standards are made up of a number of Competency Standard Units. These units describe a key function or role in a particular job function or occupation. Each unit identifies a discrete workplace requirement and includes the knowledge and skills that underpin competency, as well as language, literacy and numeracy and Occupational Health and Safety requirements. A competency standard unit is usually linked to one or more AQF qualifications.
Complex testing	Complex testing refers to dielectric dissipation factors tests, partial discharge, applied and induced HV tests, CT and VT accuracy tests (calibration), watts loss, ratio confirmation tests, tests on interconnected equipment, sf6 tests.
Compound catenary system	Rail traction specific term. A system which consists of a main catenary, an auxiliary catenary, and a contact wire.
Computerised test equipment work	Computerised test equipment work may include, for example: Secondary injection test sets, primary test sets, insulation test sets, timing test sets, Circuit breaker test sets, magnetic test sets.

Term	Definition/Explanation
Conductor	A wire or other form of conducting material suitable for carrying current, but not including wire or other metallic parts directly employed in converting electrical energy into another form. Refer to AS/NZS 3000:2000
Contact /Trolley wire	Rail traction specific term. A grooved solid copper or copper alloy conductor. Its functions are: To carry current to the vehicle pantographs To provide a mechanically continuous path for pantograph running and current collection.
Contact/Trolley wire only system	Rail traction specific term. A system which consists of a single contact/trolley wire with no catenary wire.
Contributions to OHS	Includes listening to the ideas and opinions of others in the team; sharing opinions, views, knowledge and skills; identifying and reporting risks and hazards; using equipment according to guidelines and operating manuals; behaviour that contributes to a safe working environment which includes following OHS procedures.
Controlling risks	Assessing the OHS consequences of materials, plant or equipment prior to purchase; obtaining expert advice; appropriate application of measures according to the hierarchy of control, and eliminating risk by means of: engineering and administrative controls and personal protective equipment; designing safe operations and systems of work; including new OHS information into procedures; and checking enterprise compliance with regulatory requirements.
Control measures	May include elimination of hazards, work procedures, Standard Operating Procedures, personal protective equipment, fire safety, plant and equipment isolation, training and supervision of appropriate persons, communications with appropriate persons.
Crossing Pan	Tram traction (including heritage) specific term and relates to gunmetal device used to direct a tram collector shoe at locations of crossing trolley wire, and can range from 15-90 degrees.
Current collector shoe	Tram traction (including heritage) specific term and relates to current collecting device fitted to a pole on top of a tram

Term	Definition/Explanation
	vehicle
De-energised	Means not connected to any source of energy but not necessarily isolated Refer to NENS 03-2003
Diagnostic, testing and restoration	May involve appropriate documentation relating to the protection device; voltage, current and resistance measuring instruments; microprocessor based diagnostic test equipment; laptop computer and diagnostic software; loop control test instruments.
Documenting detail work events, record keeping and or storage of information	All forms of documenting information including, paper based, and electronic (computer) based Related to tasks includes time sheets; requisitions; work sheet/job cards; organisational forms/electronic templates. May include standard operating procedures; OHS and environmental legislative requirements; manufacturer's specifications; Australian Standards; maintenance records; standard operating procedures; OHS and environmental legislative requirements; manufacturers' specifications; codes. May also include coordinated maintenance plans and/or strategies, maintenance scheduling documents, budgets, reports, submissions, cost benefit risk assessments and work plans and/or other developments
Down Track	Rail traction specific term. This is the track on which the normal train/tram running is away from a specified datum station or location.
Drawings and specifications	May include instrument electrical drawings; circuit diagrams; component charts; wiring diagrams; site layout drawings.
Droppers	Rail traction specific term. Support the contact/trolley wire(s) from the catenary at set intervals
Ear	Tram traction (including heritage) specific term and relates to support the trolley wire at a span and allows the collector shoe to pass unhindered.
Earthed	Means connected to the general mass of earth by a conductor to ensure and maintain the effective dissipation of electrical energy. Refer to NENS 03-2003

Term	Definition/Explanation
Elastic/Resilient fitting	Tram traction (including heritage) specific term and relates to trolley wire support fittings designed to provide a resilient passage to the collector shoe or pantograph and can be single or double pendulums, steady arms, delta suspension or similar.
Electrical equipment	Wiring systems, switchgear, controlgear, accessories, appliances, luminaries and fittings used for such purposes as generation, conversion, storage, transmission or utilisation of electrical energy. Refer to AS/NZS 3000:2000
Electrical infrastructure	Equipment and systems for supplying and distributing electricity.
Electrical operating work	Means work involving the operation of switching devices, links, fuses or other connections intended for ready removal or replacement, proving electrical conductors de-energised, earthing and short-circuiting, locking and tagging of electrical apparatus and erection of barriers and signs. Refer to NENS 03-2003
Energised	Means connected to any source of energy. Refer to NENS 03-2003
ERAC	Electrical Regulatory Authorities Council ERAC is the council responsible for the liaison between the technical and safety electrical regulatory authorities of eight Australian States/Territories and New Zealand. Website http://www.erac.gov.au/
Environmental and Sustainable Energy Procedures	Environmental and Sustainable Energy procedures as laid out in the appropriate environmental legislation and may include relevant federal legislation; relevant state/territory legislation; relevant local government by-laws; relevant government or quasi government policies and regulations; relevant community planning and development agreements, e.g. land care agreements. Sustainable Energy Practice refers to workplace actions that contribute to the reduction of greenhouse gases. Sustainable Energy Practice is closely related to the ‘environment’. Sustainable energy practice aims to reduce the amount of wastage in electricity and other forms of energy that lead to the production of greenhouse gases. Many of the principles

Term	Definition/Explanation
	<p>and practices that apply in the workplace also apply in the home and the general environment. These include:</p> <ul style="list-style-type: none"> • examining work practices that may use excessive electrical energy; • reducing energy by using energy efficient machines and appliances (e.g. star ratings); • switching off devices such as lights, machines and computers when not in use; • using power-save devices, such as those incorporated in photocopiers, business machines; • replacing incandescent lamps with compact fluorescent lamps; • using natural light to replace artificial light; • regularly cleaning air conditioner filters; • closing windows and doors when climate control units are used; • insulating dwellings, offices and workplaces and preventing draughts; • using reflective curtains to control heat; using natural or artificial shade to control sunlight; • using solar water heating; • using automatic processes to manage energy usage; • reusing materials used in construction, engineering and manufacturing; • recycling waste materials; • driving motor vehicles and other machines with care; • using natural gas for heating rather than oil or coal based fuels; • using devices to reduce water usage; • checking for leakage in hot water system pressure relief valves and elsewhere in plumbing systems; • sharing information about energy conservation with other workers.
Environmental legislation	Environmental legislation may include Relevant federal legislation; relevant state/territory legislation; relevant local government by-laws; relevant government or quasi government policies and regulations; relevant community planning and development agreements (e.g. land care agreements)
Environmental	Environmental management documentation may include

Term	Definition/Explanation
management documentation	information on applicable environmental laws or other requirements; complaint records; training records; process information; process operational log books; inspection, maintenance and calibration records; relevant contractor and supplier information; incident reports; information on emergency preparedness and response; records of significant environmental impacts; audit results; management reviews
Equipotential bonding	Special electrical connections intended to bring exposed conductive parts or extraneous conductive parts to the same or approximately the same potential, but not intended to carry current in normal service. Refer to AS/NZS 3000:2000
Established procedures	<p>May include formal arrangements of an organisation, enterprise or statutory authority of how work and safe systems of work are to be done.</p> <p>These may include quality assurance systems such as manufacturers' manual/specifications, requirements and procedures, work orders/instructions reporting procedures; improvement mechanisms; technical standards; compliance requirements; safety management.</p> <p>Work clearance systems such as work permits and/or access authorisation permits; monitoring and clearance procedures; isolation procedures; authorisation;</p> <p>OHS practices and emergency response and evacuation procedures;</p> <p>Procedures for operating safety systems, operating plant and equipment and reporting work activities;</p> <p>Maintenance, modification or supply of relevant schematic drawings and technical data;</p> <p>Arrangements for dealing with emergency situations.</p>
Essential knowledge and associated skills (EKAS) learning specification (LS)	<p>Provide specific advice in facilitating consistency and reliability in resource development and delivery. The learning specifications are premised on the separate content of the essential knowledge and associated skills section of the expanded Volume 2 - Essential Knowledge and Associated Skills clauses, which are referred to in each Competency Standard Unit.</p> <p>The specifications are designed to:</p> <ul style="list-style-type: none"> • Provide the depth and breadth of essential knowledge and

Term	Definition/Explanation
	<p>associated skills to be learned</p> <ul style="list-style-type: none"> • Ensure they support the needs of the workplace • Contain assessment strategies, including a table of specifications, to increase validity, reliability and fairness • Detail the resources required for satisfactory delivery in the learning environment • Provide clarification regarding the type and quantity of evidence needed for assessment purposes • Support a variety of delivery modes (e.g.: face-to-face, distance, computer assisted learning or other) • Provide content and structure that maximizes learning retention • Provide a clear purpose statement about their relationship to the overall educational program
Exposed conductor	<p>Means an electrical conductor, approach to which is not prevented by a barrier of rigid material or by insulation that is adequate under a relevant Australian Standard specification for the voltage concerned.</p> <p>Refer to NENS 03-2003</p>
Fall Prevention	<p>Safe Work Practices that effectively control all access to, egress from, transfer between structures and working at height where the fall potential is greater than 2 metres either above or below ground level.</p> <p>Assurance that the risk of someone falling from a height is controlled by at least one of the following measures: scaffolding (securely fenced work platform) physical barriers such as perimeter screens or fencing physical restraints such as catch platforms or safety nets fall arrest devices.</p> <p>Assurance that objects do not fall on people. An employer must provide a safe way of raising and lowering debris, materials and plant.</p> <p>Secure physical barriers must be used to prevent objects falling from buildings or structures. If it is not possible to provide a secure physical barrier, the employer must provide something which arrests the fall of an object. Safety helmets must be provided if there is no secure physical barrier.</p> <p>Assurance that scaffolding is erected and dismantled in accordance with Australian Standard AS 1576.1 - 1995. Access must be prevented if the scaffold is incomplete or unattended. If a person could fall more than 4 metres from a scaffold, an employer must ensure that a competent person</p>

Term	Definition/Explanation
	<p>inspects the scaffold before it is used. Unsafe scaffold must be repaired or altered before use. The scaffold must be reinspected every 30 days, or whenever it has been repaired, or whenever there are changes that may affect the scaffold - such as severe storms. These provisions are based on the National Standard for Plant.</p> <p>Assurance that a person working in a lift well is protected from objects and movement of the lift car. This includes providing a safe working platform, adequate protection decking and a suitable means of access to the work. These provisions are based on the National Standard for Plant.</p> <p>An employer must ensure that permanent walkways are provided on brittle or fragile roofs to protect someone from falling. If this is not possible, they must provide temporary walkways or other methods of fall prevention.</p> <p>Assurance that people maintaining buildings, including when cleaning windows, are protected from falls. This includes providing safe access and appropriate fall arrest devices.</p>
Feeder	Rail traction specific term. Provide traction supply from substations and section huts/tie stations.
First Aid	Initial care or treatment of an injured or sick person, given as an emergency measure until the services of medically qualified personnel can be obtained. First aid measures are designed to preserve life, promote recovery and prevent the injury or illness from becoming worse. Occupational Health and Safety legislation usually covers first aid requirements in employment. For the purpose of the Electricity Supply Industry, First Aid includes cardiopulmonary resuscitation or CPR.
Floating	Rail traction specific term. Insulated from earth, rail and all sources of supply but where failure of such insulation may result in becoming live.
Frog	Tram traction (including heritage) specific term and relates to gunmetal device used to direct a tram collector shoe at locations of diverging trolley wire at track turnouts
Frog leg	Tram traction (including heritage) specific term and relates to span or leg used to provide tension to the trolley wire anchoring at the frog. Also provides registration and alignment for the frog

Term	Definition/Explanation
Hanger	Tram traction (including heritage) specific term and relates to supports the trolley wire ear to the span wire
Height measuring stick	Insulated stick, approved & tested, for measuring the height of aerial conductors or equipment. They are usually telescopic with the lower section being hollow.
Hazards	<p>Something with the potential to cause injury and disease to persons, property or disruption to productivity. Hazards arise from workplace environment; use of equipment; poor work design; inappropriate systems, procedures and or human behaviour.</p> <p>May include confined spaces, electricity, gas, manual handling, noise, plant and equipment, infected blood, chemicals, temperature extremes, lightning and radiation.</p> <p>Making inventories of, and inspecting, high risk operations; and inspecting systems and operations associated with potentially hazardous events, for example, emergency communications, links to emergency services, fire fighting, chemical spill containment, bomb alerts and first aid services.</p> <p>Confined spaces, gas, electricity, manual handling, noise, plant and equipment, infected blood, chemicals, temperature, lighting, radiation.</p>
Identifying hazards	Workplace inspections, including plant and equipment; audits; maintaining and analysing Occupational Health and Safety records, including environmental monitoring and health surveillance reports; maintenance of plant and equipment; reviews of materials and equipment purchases, including manufacturers and suppliers information; and employee reporting of Occupational Health and Safety issues.
Impedance bond	Rail traction specific term. May be found in the train electrified rail system in both single or double rail arrangements and is there to provide DC traction return current path around insulated rail joints of the signalling track circuits.
Incidents of environmental impact	Incidents of environmental impact may include emissions to air; releases to/of water; releases to land; disposal of waste; contamination of land; impact on communities; destruction of habitat; use of energy sources; waste generation processes and technologies; extraction of water; changes to water temperature; changes to water salinity; regulation of flow; land use; and may involve the implementation of emergency

Term	Definition/Explanation
	responses
Inspan Feeder	Rail traction specific term. Carry current between the catenary and contact wires and minimise the current flow in droppers by providing a low resistance path between the wires.
Inspect	To examine or check a system, assembly, component or part by visual or physical means, for the purpose of identifying defects or limits
Insulated	Separated from adjacent conducting material by a non-conducting substance or airspace permanently providing resistance to the passage of current, or to disrupt discharge through or over the surface of the substance or space, to obviate danger of shock or injurious leakage current. Refer to AS/NZS 3000:2000
Isolated	Means disconnected from all possible sources of energy by means that prevent unintentional energisation of the apparatus of the apparatus and that are assessed as a suitable step in the process of making safe for access purposes. Refer to NENS 03-2003
Learning Specification (LS)	See Essential knowledge and associated skills (EKAS) learning specification (LS)
Jumpers	Provide electrical connection between two wires.
Knuckles	OHW components to positively locate or position two adjacent conductors relative to each other.
Legislation	Includes relevant sections of Federal and State OHS and Environmental Protection Acts. Government acts and regulations; Australian Standards and Codes of Practice; environmental legislative requirements. May also include; State or Territory acts and regulations; workers compensation legislation; employee code of conduct; anti discrimination legislation; equal employment opportunity legislation; disability legislation; trade practices legislation; native title legislation; related regulations; common law.
Life Plan evaluations	Life Plan evaluations usually relate to systems involving: Manufacturer's recommendations; reliability performance profiles; knowledge of local history and experience; consultation with other Authorities; environmental influences;

Term	Definition/Explanation
	present practices.
Live	Means energised or subjected to hazardous induced or capacitive voltages. Refer to NENS 03-2003
Live work	Means all work performed on components of electrical apparatus, not isolated, proved de-energised and earthed. Refer to NENS 03-2003
MSDS	Material Safety Data Sheets Information and handling of chemicals/flammable liquids are involved.
Maintenance and or modification procedures	Maintenance is performed at defined intervals to retain a system, component or part in a serviceable condition by systematic inspection, detection, replacement of worn-out items, adjustment, calibration or cleaning, etc Maintenance may include: Warranty inspections and repairs; routine inspections/examinations; preventative maintenance; condition monitoring processes and procedures; minor/major overhauls requirements; retirement/scraping evaluations; diagnosis and repair of faults. Maintenance tasks will generally be carried out under access permits and in proximity to energised HV and LV conductors and equipment.
Management of projects	Projects may include: the modification to existing equipment and associated circuits, for example: existing secondary circuits and or installation/replacement of primary and secondary apparatus
Mast Labels	Used to identify overhead wiring structures by showing an alpha &/or numeric code which indicates the location of the structure. It can indicate the Line and the distance of the structure from a nominated datum point.
Mast/Pole	Rail traction specific term. A vertical structure that supports the overhead traction wiring. They are normally galvanised rolled steel section, but can be fabricated steel, concrete or timber.
Near	Means a situation where there is a reasonable possibility of a

Term	Definition/Explanation
	<p>person, either directly or through any conducting medium, coming within the relevant safe approach distances.</p> <p>Refer to NENS 03-2003</p>
Negative bus	A metal bar, insulated from earth, for the termination of negative cables.
Notification	Notification (Notified) may include verbal, written, electronic or recorded information during or at the completion of work, which may be required to be completed in accordance with established procedures.
OHS practices	In accordance with all relevant OHS legislation, particularly: general duty of care; requirements for maintenance and confidentiality of records of occupational injury and disease; provision of information and training; regulations and codes of practice relating to hazards present in work area; health and safety representatives and OHS committees; issue resolution.
OHS issues	<p>That could be raised by workers or designated persons include hazards identified; problems encountered in managing risks associated with hazards; clarification on understanding of OHS policies and procedures; communication and consultation processes; follow up to reports and feedback; effectiveness of risk controls; training needs.</p> <p>Issues can also be raised at Occupational Health and Safety committees and other committees, for example, consultative, planning and purchasing; health and safety representatives; employee and supervisor involvement in Occupational Health and Safety management activities, for example, Occupational Health and Safety inspections, audits, environmental monitoring, risk assessment and risk control; procedures for reporting hazards, risks and Occupational Health and Safety issues by managers and employees; and inclusion of Occupational Health and Safety in consultative or other meetings and processes.</p>
OHW rail connection stick	<p>Rail traction specific term. A specific type of operating stick used for rail connecting, testing and bridging both live and isolated traction overhead wiring conductors or equipment.</p> <p>With regards to trams this item would possibly be associated with Contract/Trolley – Rail Short-circuit using standard clamps and operating sticks.</p>
Operational environment.	An operational environment may include the area where work

Term	Definition/Explanation
	is carried out or an area remote from the plant and equipment; Operation may be assisted by remote indicators of plant and apparatus status; Operation may be affected by inclement or otherwise harsh weather conditions and/or during night periods.
Operating Stick (Rod)	An insulated stick, approved & tested, used for operating or working on live high voltage conductors, traction conductors or equipment.
Out of Commission	Means the condition of electrical apparatus which is not electrically connected and declared to be so in writing to the operating authority responsible for the electrical apparatus.
Overhead line (or aerial line)	Means any aerial conductor or conductors with associated supports, insulators and other apparatus erected, or in the course of erection, for the purpose of the conveyance of electrical energy. Refer to NENS 03-2003
Overhead wiring (OHW)	Rail traction specific term. All traction overhead wires and associated equipment that normally conducts, isolates or may be energised including contact/trolley wires, catenary, feeders and switching, tensioning and support equipment.
Overlap arrangements/air gaps	Rail traction specific term. The OHW arrangement between two anchor structures, where two adjoining OHW runs overlap and terminate.
Over-run protection	Rail traction specific term. Arrangements for minimising damage to pantographs when a train/tram enters an unwired section from a wired section.
Pantograph	Rail traction specific term. An apparatus fixed to the roof of electrical traction vehicles to draw current from the overhead supply. In Victoria heritage trams have pole and current collector shoe for the same purpose.
Pennant insulator	Rail traction specific term. Installed in catenary and contact wires in out-of-running locations between wires of different sections. This term is not used in all States/Territories.
Permits and/or permits to work	The permit to work is an authorisation for an individual to work to a schedule or in required activities and functions associated with the Electricity Supply Industry.

Term	Definition/Explanation
	<p>Include any documents or forms approved for use by enterprise safety rules and permit to work procedures.</p> <p>Permits include electrical access permits, vicinity authorities, contractors' authorities, clearances and testing authorities, trip isolation sheets, statement of condition of equipment and plant (SCAP), permit to work and work plans.</p>
Personnel	<p>May include individuals with responsibilities for coordination, design, installation, maintenance, production or servicing activities such as: site managers, project managers, engineers and technicians, technical experts, line managers/supervisors, regulatory personnel, team leaders, other personnel designated by an organisation or enterprise.</p>
Personal protective equipment	<p>Means protective clothing, equipment or a combination thereof that is worn by a person for protection against electrical hazards.</p> <p>Refer to NENS 09 - 2004</p>
Pre-commissioning	<p>Refers to the installation, maintenance, fault finding and/or repair to a new or existing electricity network equipment, where a new section is being added and is de-energised, or has been de-energised by appropriate personnel for augmentation to an existing Network, to be undertaken in accordance with requirements and established procedures. It includes the checking and testing of the equipment or circuits for integrity and performance at the completion of the work before it is handed over for re-energisation/energisation. Conducting full commissioning or return to service procedures of the equipment or circuits to the Network must be undertaken by appropriate personnel, authorised to undertake this function according to requirements and established procedures.</p>
Primary equipment	<p>Primary equipment may include: transformers, switchgear, secondary circuits, SCADA remote terminals, Programmable Logic Controllers (PLC), electrical control and meter/alarm circuits, protection control equipment, secondary electronic equipment and communication systems.</p>
Procedures for operating safety systems, operating plant and equipment and reporting work activities.	<p>In accordance with workplace procedures for: risk assessment and management; inspection; housekeeping; consultation processes, either general or specific to OHS training and assessment; specific hazard policies and procedures; OHS information; OHS record keeping; maintenance of plant and equipment; purchasing of supplies and equipment</p>

Term	Definition/Explanation
	counselling/disciplinary processes.
Pull Off arrangements	Rail traction specific term. Arrangements that hold the catenary and contact wires in their horizontal position, but are not intended to support the weight of wires.
Pull Off Mast	Rail traction specific term. Does not support the wiring, but pulls the wires to the correct location with respect to the track.
Quality assurance systems	Examples: specifications, requirements and procedures, work orders/instructions, reporting procedures, improvement mechanisms, compliance requirements and or safety management.
Rail bond	Rail traction specific term. A cable fixed across a break or joint in one rail, or between two rails &/or tracks to provide a path for traction return current or track circuits.
Rail connected or rail connection	Rail traction specific term. An approved connection of the traction OHW to the negative return rail (traction rail), to ensure the immediate effective discharge of electrical energy from the traction OHW equipment to rail in the event of equipment concerned being, or becoming, live.
Refresher Training	A competency confirmation event which may include training, the purpose of which is to compensate for or prevent deterioration in a previously achieved standard of performance.
Relevant switching programs	May include operations where HV and LV isolations are required to isolate a work area, operations where switching involves multiple and interconnecting network feeders, commissioning isolating/paralleling zone and/or terminal substation equipment, transmission and/or distribution systems, bus sections, and transformers.
Requirements	<p>Requirements relate to that to which equipment and procedures and their outcomes must conform and include statutory obligations and regulations and standards called-up by legislation or regulations.</p> <p>Requirements may also include: statutory regulations, codes of practice, job specifications, transport documentation, standards called-up in specifications be they Australian/New Zealand or International, procedures and work instructions, quality assurance systems, manufacturers' specifications, maintenance manuals, schedules and specifications/standards for network distribution systems, substation schedules,</p>

Term	Definition/Explanation
	switching schedules, circuit/cable schedules, design specifications including resource estimating models, customer/client requirements, and specifications, specified essential knowledge and skills as stated under clause 6.1 in a unit's Evidence Guide, street survey plans and relevant maps.
Safe approach distance	Means the minimum separation in air from an exposed conductor that shall be maintained by a person, or any object (other than insulated objects designed for contact with live conductors) held by or in contact with that person. Refer to NENS 03-2003
Safety observer	Means a person competent for the task and specifically assigned the duty of observing and warning against unsafe approach to electrical apparatus or other unsafe conditions. Refer to NENS 03-2003
Safe Design Principles	<p>Safe Design principles encompassing:</p> <ul style="list-style-type: none"> • Safe Design Duty related information • This information provides the legal motivation for engagement in the safe design process. Some examples include legislative obligations of 'designers', application of relevant national standards and codes of practice for ESI, upstream obligation bearer prosecution cases, and common law cases. • Safe Design Process (or problem specific) related information <p>This information should include material that provides guidance about how generally to go about the safe design process. It is expected that some examples will be available from workplace safety including some specific industries. Parallel examples might be available on other fields such as product safety.</p> <ul style="list-style-type: none"> • Safe Design evaluations <p>From a preliminary review of industry stakeholder, client and customer feedback, evaluations of safe design initiatives are likely to be important in order to provide justification for safe design. This material may also provide examples of financial effects, cost benefit analysis etc of safe design.</p> <p>Note: A useful resource in this area will be the proposed <i>NOHSC</i></p>

Term	Definition/Explanation
	<i>Safe Design Guide</i> due out in late 2004.’
Section hut or tie station (also known as track section cabin)	Rail traction specific term. A building generally located between substations containing circuit breakers providing protection and sectioning of the overhead traction supply system and, on multiple tracks, for improving voltage regulation.
Section insulator	Rail traction specific term. Separates two electrical sections in a contact/trolley wire run, while maintaining smooth and secure passage of vehicle pantographs.
Short-circuit, short-circuited	The connection by a low resistance path between two or more points in an electrical circuit. In the DC traction system a connection by an approved device between the positive conductor of traction voltage apparatus to rail or rail-connected negative conductor of the apparatus.
Simple catenary system	Rail traction specific term. A system which consists of one or two catenary wire(s) supporting one or two contact wire(s).
Span/Span network	Tram traction (including heritage) specific term and relates to steel or insulated rope (parafil) support wire or wire network to provide support and registration for the trolley wire
Specialist tools	LV detectors, LV polarity testers and LV phase rotation indicators, HV phasing sticks, HV link sticks, HV line clamp operating sticks, HV ground transformer isolating handles and associated earths, HV operating earths, HV detectors and voltmeters.
Substation	Means a switchyard, terminal station or place at which high voltage supply is switched, converted or transformed. Substations include the following – traction substations, transformer rooms, switch rooms, section huts, pole-mounted or pad-mounted transformers which contain high-voltage electrical equipment Refer to NENS 03-2003
Superelevation (or cant)	Rail traction specific term. Where curves occur on the track the rail on the outside of the curve may be higher than the inside rail to counteract the centrifugal force of the vehicle on the bend. This difference in the rail height is called superelevation. The amount of superelevation depends on the radius of the

Term	Definition/Explanation
	curve and the usual speed of the vehicles and constraints such as road profiles for street based rail systems.
Support and registration arrangements	Equipment that supports and holds the conductors in their designed positions.
Support structures/spans or networks	Structures/spans or networks on which the support and registration arrangements are mounted.
Surge arresters/diverters or Lightning arresters	Equipment for suppressing electrical surges travelling along the OHW conductors.
Switchgear	<p>Equipment for controlling the distribution of electrical energy or for controlling or protecting circuits, machines, transformers, or other equipment.</p> <p>Includes: HV/LV fuses, LV links and bridges; HV reclosers, ring main units, circuit breakers, isolators, earth switches, sectionalisers, HV links, air break switches, capacitor banks, transformer tap changes (on and off load) metering and protection equipment and data communication systems, voltage regulators, reclosers.</p> <p>Refer to AS/NZS 3000:2000</p>
Tension regulator	An arrangement for maintaining constant tension in the overhead wiring conductors. It can do this by attaching the conductor, via a galvanised wire rope through a pulley system, to a track of steel or concrete weights at the end of the wire run. Tension regulation can also be achieved using spring systems.
Testing and recording equipment	<p>Testing and recording equipment could include: Digital bearer test equipment; Voice frequency analysers; RF mounting equipment; RF spectrum equipment; Multimeters; Communication testers; Transmission measuring sets; Directional couplers; Laptop computers. Or</p> <p>Infrascan equipment; Phasing equipment; Recording meters; Trend monitoring equipment; Condition monitoring equipment; Diagnostic testing devices using computer hardware and software; Taplon sticks; Insulation and continuity test instruments; Voltage, resistance and current testers; Ductors; Ratio meters; Earth systems testing devices; Capacitor bridge meters; Doble Test sets devices; High voltage alternating current test sets; Scope meters; Clip on ammeters; Test plans for automatic relay testing SCADA systems used for developing and evaluating voltage regulation</p>

Term	Definition/Explanation
	systems, circuit breaker reclosing systems, VAR's monitoring and similar computer controlled diagnostic testing and recording. Or AC/DC test sets; IR testers; earth resistance meters; cable fault location equipment; circuit breaker timers; recording equipment; devices utilising computer hardware and software; oil dielectric strength equipment; trend monitoring equipment; infrared thermographic equipment; schering bridge; partial discharge test equipment; double insulation test set; primary injection test sets; CT and VT calibration equipment and SF6 leakage testers.
Testing procedures	Tests may include: DC/AC measurements, error, continuity, noise level, return loss, spectrum analysis, radio on receiver sensibility, surveys - mobile phones/pager, end to end, line levels both in and out, transmitter power, transmitter frequency, transmitter deviation, receiver frequency and sensitivity, level and quality of demodulated output - audio/bit error rate, antenna sweep measurements, power and environmental conditions including emergency power plant.
Terminal insulator	Installed between a catenary or contact wire and an anchor structure.
Traction rail/Power rail	Rail traction specific term. Rail that conducts the traction return current. May include multiple rails or may be just one rail, depending on the type of signalling system used in the section and the number of tracks.
Traction return current	Rail traction specific term. The electric current returning from the overhead traction supply to substations.
Transmission medium	Transmission medium may be: Copper cables; Coaxial cables; Optical fibre cables; Radio; Satellite; Microwave.
Unit(s) of competency	See competency standard unit(s).
Up Track	Rail traction specific term. The normal train/tram running towards a specified datum station or location.
Voltage	Differences of potential normally existing between conductors and between conductors and earth as follows: Extra-low voltage: Not exceeding 50V ac or 120V ripple-free dc. Low voltage: Exceeding extra-low voltage, but not exceeding 1000V ac or 1500V dc.

Term	Definition/Explanation
	High voltage: Exceeding low voltage. Refer to AS/NZS 3000:2000
Vicinity	Means a situation where it is unlikely that a person will, either directly or through any conducting medium (e.g. via mobile plant) come within the relevant safe approach distances.
Work clearance systems	Example: work permits monitoring and clearance procedures and or isolation procedures.
Working earth	Means approved earthing and short-circuiting equipment applied to electrical apparatus, additional to access authority earths, following the issue of an access authority. Refer to NENS 03-2003

1.2 Glossary of Terms Related to Occupational Health and Safety

This Glossary of Occupational Health and Safety (OHS) Terms has been developed to assist competency developers and writers, reviewers of training packages and those developing any training specification or learning materials for the Vocational Education and Training environment.

In Australia we consider that the rate of workplace fatality, injury and ill-health is far too high. To reduce this toll we need to make some changes in the work place and this requires training to enable business and workers to effectively manage safety.

We must get OHS right in the competency so that the resultant learning contributes to improving the capacity of those in the workplace to manage safety. This applies not only to the 'designated' OHS units but to the integration of OHS, as appropriate, into all competencies, learning programs and learning resources.

The Competency Standard Unit TAADES505A *Research and develop competency standards* specifies the outcomes and the knowledge and skills required to research and develop documents which outline competency requirements for a particular job function, work process, work role or specific vocational outcome. This competency cites four phases in developing a competency:

1. Research the competency area
2. Formulate competency specifications
3. Validate competency specifications
4. Finalise competency specifications.

OHS is a critical aspect of research into the competency area, and also an important aspect of work performance to be integrated within a competency.

As in many technical areas, OHS has its own language. OHS affects all of us, however key words and terms are not always used in a consistent manner and this can lead to confusion. To maximise the effectiveness of our training and education we need to ensure that our use of the OHS language is as consistent and clear as possible.

This glossary is not intended as a definitive dictionary of OHS terms but is designed to be used in the second phase of competency development, formulate the competency specifications. It is also an invaluable tool for those involved in the design and development of learning resources.

Further information on OHS hazards, practical guidance material, standards and codes of practice is available at the National Occupational Health and Safety Commission website at www.nohsc.gov.au

The glossary is intended to be an evolving and dynamic document and those wishing to comment on the terms or suggest additions or modifications should email the Team Leader of the OHS Skills Development Team at NOHSC.

NOHSC term	Definition/Explanation
Accident	A term that is now considered out of date. Preferred term is <i>incident</i> .
Accountability	The process by which a person with OHS responsibilities is answerable to a higher authority.
Action level	The level at which a risk is considered to be unacceptable and action is required to reduce the level of risk. May be specific such as a noise level at which hearing protection must be worn, a concentration of chemical or more generic.
Action plans	Documented plans developed within the workplace to implement OHS management, which include allocated responsibilities and time frames.
Administrative controls	Management practices that aim to control employees' exposure to specific hazards, and generally improve health and safety – examples include the use of job rotation, job enlargement
ALARA (As Low As Reasonably Achievable)	A basic concept where risks are kept as low as is reasonably achievable. ALARA is determined by reference to established codes and standards and consultation with groups impacted by the decision outcomes including those exposed to the risk.
Anthropometry	The science dealing with the comparative measurement of the size and proportions of the human body, the range of movement of limbs, as used in ergonomics.

NOHSC term	Definition/Explanation
Audit	A systematic examination against an agreed benchmark of the approach to managing safety to evaluate an organisation's arrangements for identifying hazards, assessing and controlling risks, and monitoring and improving the effectiveness of the management of OHS and compliance. (Note a workplace inspection is NOT an audit.)
Audit tools	<p>The instruments for collecting evidence and conducting the analysis and evaluation (they are not the same as the audit criteria or benchmark), they may be:</p> <ul style="list-style-type: none"> • developed specifically for the purpose • adapted from existing tools • purchased or accessed from existing tools. <p>They include:</p> <ul style="list-style-type: none"> • performance checklists • sets of questions to be asked • descriptions of required characteristics to be checked • limitations and instructions for use.
Authorisation of permit	Signing of permit by competent person.
Biomechanics	The application of mechanics (forces and motion) to analyse body movement and the stresses involved in body posture during movement.
Causative event	Key event that resulted in the particular outcome(s) of injury or damage.
Circumstance	Short-term situation that is relatively unusual, such as a storm or when a key person is absent.
Certification	Refer <i>operator certification</i> .
Common law	Law that is derived from the English legal system and has evolved through judicial decision and practice (case law) that establishes and follows precedent. Note difference to 'statute law'.
Condition	Permanent situation such as type of equipment, work practice, design of work environment (often different to detect or identify) that may contribute to risk.
Consequence	The injury or damage outcome of an event, which may be expressed quantitatively or qualitatively, there may be a range of possible

NOHSC term	Definition/Explanation
	outcomes for a specific event or scenario.
Confined space	<p>An enclosed or partially enclosed space which:</p> <ul style="list-style-type: none"> is at atmospheric pressure during occupancy is not intended or designed primarily as a place of work, and is liable at any time to: <ul style="list-style-type: none"> - have an atmosphere which contains potentially harmful levels of contaminant - not have a safe oxygen level or - cause engulfment - may have restricted means for entry and exit. <p>A confined space is determined in part by the hazards associated with a defined set of circumstances (restricted entry or hazardous atmosphere, risk of engulfment) and not just with work performed in a restricted space. Examples include but may not be limited to:</p> <ul style="list-style-type: none"> • storage tanks, tank cars, process vessels, boilers, pressure vessels, silos and other tank-like compartments • open-topped spaces such as pits or degreasers • pipes, sewers, shafts, ducts and similar structures • shipboard spaces entered through a small hatchway or access point, cargo tanks, cellular double bottom tanks, duct keels, ballast and oil tanks and void spaces (but not including dry cargo holds). <p>A person is deemed to have entered a confined space when their head (i.e. the breathing zone) or upper part of the body is within the boundary of the confined space. (Note that inserting an arm for atmospheric testing is not considered an entry to a confined space).</p> <p>References:</p> <p><i>AS/NZS 2865:2001 Safe working in a confined space</i></p> <p><i>Handbook – HB 213:2003 Guidelines for safe working in a confined space</i></p>
Consultative arrangements	<p>State and Territory OHS legislation specifies obligations for workplace consultation. The workplace arrangements to meet these obligations may include:</p> <ul style="list-style-type: none"> • OHS and other consultative and planning committees • health and safety and other employee representatives • employee and supervisor involvement in OHS activities such as inspections and audits • procedures for reporting hazards, and raising and addressing

NOHSC term	Definition/Explanation
	<p>OHS issues</p> <ul style="list-style-type: none"> • employee and workgroup meetings. <p>When developing consultative arrangements, consider:</p> <ul style="list-style-type: none"> • language • shift work and rostering arrangements • timing of information and data provision • literacy and numeracy levels • workers with special needs • workplace organisational structures (for example, size of organisation, geographic, hierarchical) • cultural diversity • management approach • workplace culture and approach to OHS by managers, supervisors and employees.
<p>Controls See also Hierarchy of control</p>	<p>The devices and methods of controlling the effect of the hazard so that the risk of injury is minimised. The ‘quality’ of the control is the level and reliability of the control compared with the level of risk. The quality of the controls is determined by the best available technology or approach which:</p> <ul style="list-style-type: none"> • should be applied when the most probable outcome is death or serious injury • may be applied where the most probable outcome is less serious. <p>Refer also <i>Hierarchy of control</i>.</p> <p>Workplace factors that impact on the controls selected and the implementation include:</p> <ul style="list-style-type: none"> • language • shift work and rostering arrangements • literacy and numeracy • workplace organisational structures (e.g. geographic, hierarchical) • cultural diversity • training required • workplace culture related to OHS, including commitment by managers and supervisors and compliance with procedures and training.
<p>Control measures</p>	<p>Devices, systems (including work methods) or approaches that reduce exposure to workplace hazards.</p>
<p>Crisis management plan</p>	<p>A flexible document that can cope with a broad range of crisis types and:</p>

NOHSC term	Definition/Explanation
	<ul style="list-style-type: none"> • is approved at the highest levels of the organisation • focuses on management control • identifies responsibilities for decision making • details communication processes and psychological support • addresses arrangements with any contractors or shared tenancy • integrates the emergency response plans as well as recovery • incorporates dealing with external agencies and support • addresses planning for recovery before crisis occurs. <p>Documentation for crisis management plan may include:</p> <ul style="list-style-type: none"> • policy, emergency response structure, initial response instructions for various roles/areas, responsibility and authority of individual roles, warning systems, training requirements, resource inventory for response and recovery, program review and monitoring processes • crisis risk management documentation, such as risk management team lists, communications strategies, identification of issues, risk assessments/evaluations, vulnerability profiles, risk registers and treatment strategies. <p>The term <i>emergency management</i> may also apply but <i>crisis management</i> infers a more holistic approach encompassing the full range of business affairs.</p>
Dangerous Goods (DG)	<p>Those gases, liquids and solids identified and classified under the internationally agreed system which is followed in Australia and that are subject of so called ‘dangerous goods’ standards and legislation.</p> <p>The objective of the Dangerous Goods legislation is to control the storage, handling and transport of DGs to protect the safety of workers, the public, property and the environment. While dangerous goods may also be hazardous the terms should not be confused.</p>
Dangerous parts of plant	<p>Potential contact or entrapment points to which the operator may be exposed during:</p> <ul style="list-style-type: none"> • operation • examination • lubrication • adjustment • maintenance.
Design	<p>The process of bringing together innovation, aesthetics, and functionality to plan and create a product, process or system to meet the artistic, industrial or performance requirement of an individual or group. The design process involves a series of activities where an</p>

NOHSC term	Definition/Explanation
	idea is conceived, shaped, developed, produced and then acted upon to produce a designed-product. It also includes any subsequent alteration (redesign or retrofit).
Design process	<p>There are two stages of the design process:</p> <ul style="list-style-type: none"> • The concept design phase considers preliminary design options, which are assessed against product specifications to determine the best preliminary design to be developed. This phase includes concept design, research and development, feasibility and risk management (including OHS risks). • The detailed design phase develops the selected design to its final state. It includes research and development, feasibility studies, concept and detail design, technical and functional specifications, plans and drawings, operational systems, construct/manufacture options and detailed quantities, cost and risk analysis (including analysis of OHS risks).
Designed product	The item to be designed, including a built environment, structure, an item of plant or equipment, chemical, work system or process or any other physical attribute or system associated with either the work or its interface with people.
Duty of care	<p>Arises from common law but is enshrined in OHS statute law and that places into a legal form a moral duty to anticipate possible causes of injury and illness and to do everything reasonably practicable to remove or minimise these possible causes of harm.</p> <p>The key factors relating to duty of care are that:</p> <ul style="list-style-type: none"> • duty of care applies wherever there is special relationship (employer – employee, employer – contractor, supervisor – work team member, tradesperson – apprentice) • duty of care applies to all circumstances of the relationship • individual duty of care cannot be delegated (but roles and functions may be delegated) • applies personally to individuals • applies to all risks that are foreseeable and preventable • includes the concept of <i>reasonable</i>.
Elements of systematic approaches to managing OHS including OHSMSs	A list of key requirements or major principles that are combined in a methodical and ordered manner to minimise the risk of injury or ill health in the workplace; and may include processes of OHS planning, allocation of resources, communication and consultation, hazard management, record keeping and reporting, training and competency, and review and evaluation for ongoing improvement of OHS.

NOHSC term	Definition/Explanation
Emergency	<p>Events such as:</p> <ul style="list-style-type: none"> • serious injury events • emergencies requiring evacuation • fires and explosions • hazardous substance and chemical spills • explosion and bomb alerts • security emergencies — armed robberies, intruders • internal emergencies, such as loss of power or water supply and structural collapse • external emergencies and natural disasters, such as flood, storm and traffic accident impacting on the organisation. <p>May also be referred to as a <i>hazardous event</i>.</p>
Emergency agency	Includes fire, police, ambulance, relevant government departments, hazardous materials response teams (HAZMAT) and OHS authorities.
Emergency control organisation (ECO)	Structured group within the organisation that includes roles such as emergency controller, communications recorder, media liaison and employee support.
Emergency equipment	<p>Includes:</p> <ul style="list-style-type: none"> • First Aid equipment • eye wash shower or portable eye washes • fire extinguishers and equipment • communication equipment • evacuation alarms • evacuation equipment, especially that for disabled persons • torches • clothing items such as coloured hats and vests.
Emergency stops and warning devices	<p>Are fitted to plant and equipment that have a risk of entrapment or other hazard and must be:</p> <ul style="list-style-type: none"> • prominently, clearly and durably marked • coloured red (push buttons, bars or handles) • unable to be affected by electrical or electronic circuit malfunction • fitted where risk assessment identifies a need.
Enforcement	<p>Processes and instruments available to the OHS regulator under legislation may include:</p> <ul style="list-style-type: none"> • prosecution

NOHSC term	Definition/Explanation
	<ul style="list-style-type: none"> • prohibition notices • improvement notices • on-the-spot fines • provisional improvement notices.
Epidemiology	The study of the distribution and determinants of disease within human populations. Patterns of injury or illness in groups of people are studied to determine causes, identify groups at risk and to identify and evaluate methods of treatment and prevention.
Ergonomics	The study of the relationship between people, the equipment they use and their physical and social work environment.
Ergonomic interventions	<p>Includes:</p> <ul style="list-style-type: none"> • design of tools • design of workplaces • design of products • design of equipment • design of work systems, processes or organisation including work flow, planning and control • job design • development of new decision making processes • new forms and organisations of work.
Ergonomic tools and databases	<p>May include:</p> <ul style="list-style-type: none"> • engineering models • Australian and International Standards • Australian and International anthropometric databases
Explosive substance	Substance that explodes if it comes into contact with heat, flame, an ignition source or incompatible substance.
Fail-to-safe	Design feature of equipment that ensures if there is a failure or defect in the product, or another factor such as loss of power, then the product is left in a safe condition.
Functional areas and management systems	<p>Other than OHS but that impact on the management of OHS may include:</p> <ul style="list-style-type: none"> • strategic planning • purchasing, procurement and contracting • logistics • HR, IR and personnel management, including payroll • engineering and maintenance • information, data and records management

NOHSC term	Definition/Explanation
	<ul style="list-style-type: none"> • finance and auditing • environmental management • quality management.
Guarding	<p>Devices fitted to machinery to separate the operator from dangerous parts of the machine. Devices may include:</p> <ul style="list-style-type: none"> • permanently fixed physical barriers where no access of any part of a person is required • interlocking physical barriers where access to dangerous areas is required during operation • physical barriers securely fixed by means of fasteners or devices • presence-sensing safeguarding systems.
Hazard	<p>A source or a situation with a potential for harm in terms of human injury or ill health, damage to property, damage to the environment, or a combination of these.</p>
Hazards of long latency	<p>Conditions, illnesses and other health risks that result from longer term exposure to specific triggers such as chemicals, noise, radiation and psychosocial factors.</p>
Hazards of low frequency/high consequence	<p>High impact events that occur rarely such as explosions, fires and building collapses but may result in very serious injury, death or multiple death situations.</p>
Hazard identification	<p>The process of identifying sources of harm. Hazard identification may be required:</p> <ul style="list-style-type: none"> • at design or pre purchase of buildings, equipment and materials • at commissioning or pre-implementation of new processes or practices • before new forms of work and organisation of work are implemented • before changes are made to workplace, equipment, work processes or work arrangements • as part of planning major tasks or activities, such as equipment shutdowns • following an incident report • when new knowledge becomes available • at regular intervals during normal operations • prior to disposal of equipment, buildings or materials. <p>Different methods may be used to identify hazards including observation; consultation with workers, clients or other users; trial of models or prototypes; review of technical standards and other information sources; monitoring and measurement.</p>

NOHSC term	Definition/Explanation
Hazard identification tools and processes	Include: <ul style="list-style-type: none"> • analysis of incident investigations • analysis of incident, injury and claims statistics • workplace inspections • job safety analysis (JSA) • audits • cause and effect diagrams • surveys • review of research and industry literature.
Hazardous event(s)	Includes incidents with the potential to seriously harm life, health, property, the environment or a combination. May also be referred to as <i>emergencies</i> .
Hazardous substance	A substance that is listed on the National Commission's List of Designated Hazardous Substances (NOHSC:10005) or has been classified as a hazardous substance by the manufacturer or importer in accordance with the National Commission's Approved Criteria for Classifying Hazardous Substances (NOHSC:1008).
Hazardous substance register	Listing of all the hazardous substances that are used or produced in a workplace together with a current Material Safety Data Sheet for each substance. May also contain risk assessments for individual hazardous substances.
HAZCHEM	An initial response emergency action code that provides information vital to emergency services to enable them to stabilise the incident scene during the early stages of a HAZMAT incident. The Code is displayed on emergency information panels on transport vehicles and on signs on buildings. HAZCHEM codes are assigned to chemicals on the basis of their flammability, toxicity, reactivity and other relevant chemical and physical properties.
HAZMAT	A contraction of the words <i>hazardous materials</i> and may be used in a range of circumstances including HAZMAT emergency response units, HAZMAT emergency response equipment and HAZMAT registers of hazardous substances.
HAZOP (Hazard and Operability Study)	An advanced risk analysis technique that involves a systematic review of a process to determine risks and risk minimisation strategies.
Health and safety representative	An employee, elected by the workgroup, who represents the OHS interests of the people with whom they work. The function is carried out in addition to the normal work role. Processes for election of

NOHSC term	Definition/Explanation
	health and safety representatives, their role and rights are specified in State and Territory legislation.
Health promotion	<p>The promotion of health, especially as a workplace program, designed to improve and enhance employee health undertaken as a complementary activity to the prevention of work-related injury and disease.</p> <p>Also called <i>wellness</i>.</p>
Health surveillance	Monitoring or checking individuals for the purpose of identifying changes due to exposure to hazards in the workplace. May include biological monitoring.
Hierarchy of control	<p>The priority order in which hazard and risk controls should be considered with the eventual outcome often being a combination of measures. The prime emphasis is on:</p> <ul style="list-style-type: none"> • elimination, and where this is not practicable, minimisation of risk by: • substitution • isolating the hazard from personnel • engineering controls • administrative controls, eg procedures, training • personal protective equipment (PPE).
Hot work	<p>Involves using equipment that generates heat, sparks, flames or any other sources of ignition in an atmosphere that may be flammable. Includes work with welders, cutters including oxygen cutters, power tools, grinding, mobile phones.</p> <p>Hot work can also include breaking into 'live' equipment or performing work on live equipment that has the potential to release its contents (e.g. hot tap in chemical plants).</p>
Housekeeping	Describes workplace and personal routines designed to improve hygiene and safety, for example, cleaning up spills and keeping walkways, exits and traffic areas clear.
Incident	An event that has caused or has the potential for injury, ill health or damage. (<i>Incident</i> is the preferred term rather than <i>accident</i>)
(Sources of OHS) Information	<p>May be internal and include:</p> <ul style="list-style-type: none"> • hazard, incident and investigation reports • workplace inspections • incident investigations • minutes of meetings

NOHSC term	Definition/Explanation
	<ul style="list-style-type: none"> • Job Safety Analyses (JSA's) and risk assessments • organisational data such as insurance records, enforcement notices and actions, workers compensation data, OHS performance data • reports and audits • material safety data sheets (MSDSs) and registers • employees handbooks • employees including questionnaire results • OHS advisors • manufacturers' manuals and specifications.
(Sources of OHS) Information	<p>May be external, including:</p> <ul style="list-style-type: none"> • regulatory bodies and OHS Acts regulations, codes and guidance material • other relevant legislation • National Occupational Health and Safety Commission (NOHSC) and Australian Bureau of Statistics • databases such as national and state injury data and NICNAS (National Industrial Chemicals Notification and Assessment Scheme) • OHS specialists and consultants • newspapers and journals, trade/industry publications • Internet sites • industry networks and associations including unions and employer groups • OHS professional bodies • research information.
Isolation	<p>A safety device system that includes devices such as isolating switches, locks, safety bars, shields, full pressure blanks, spectacle blanks to lock controls, especially moving parts, equipment, systems or devices with stored energy, to an 'off' position while a worker is in a vulnerable position such as carrying out maintenance on rotating equipment, and electrical and hydraulic systems.</p> <p>Isolation systems generally use locking switches that need keys to open the lock and are used in conjunction with a danger tag system that promotes greater safety consciousness amongst the workforce for all situations in which danger to persons could arise from:</p> <ul style="list-style-type: none"> • the operation of machinery, plant or equipment • the flow of steam, electricity, gases or liquids • the use of faulty or unsafe plant and equipment • include multiple locking systems and involve written authorisation by a competent person.

NOHSC term	Definition/Explanation
	Also called <i>lock-out</i> and <i>tag-out</i> .
Job Safety Analysis (JSA)	Process of examining all aspects of a task to identify hazards and conditions with a potential for injury or ill health with the objective of developing risk controls including written job instructions.
Legislation relevant to OHS	Includes Commonwealth and relevant State/Territory OHS specific acts and regulations as well as: <ul style="list-style-type: none"> • workers compensation • privacy legislation • contract law • trade practices • criminal law • common law • industrial relations law • equal employment opportunity and anti-discrimination law.
Life cycle	All phases in the life of a product. Specific phases depend on the type of product but may include design, development, manufacture, construction, assembly, import, supply, distribution, sale, hire, lease, storage, transport, installation, erection, commissioning, use or operation, consumption, maintenance, servicing, cleaning, adjustment, inspection, repair, modification, refurbishment, renovation, recycling, resale, decommissioning, dismantling, demolition, discontinuance, disposal.
Likelihood	The likelihood of the occurrence of the consequence, not the likelihood of the hazard or the particular scenario.
Locked out	Equipment, which is not to be operated for any reason, may be padlocked, or otherwise prevented from operation using a keyed lock. A lockout may be accompanied by a tag out, or a lock out system may incorporate a tag. Lockout means the isolation by a mechanical device, generally a lock, which, when applied at the source, physically prevents the control to any electrical or mechanical equipment being turned on. Refer also to <i>Isolation</i> .
Manual handling	The use of force applied by a person to lift, move, carry, push, pull or otherwise move or restrain an animate or inanimate object.
Material Safety Data Sheet (MSDS)	Document describing the properties and hazards of a material or substance including statements about its chemical and physical properties, health hazards, precautions for use and safe handling instructions. All manufacturers and suppliers of chemicals are

NOHSC term	Definition/Explanation
	obliged to produce an MSDS for each hazardous chemical.
Monitoring	Involves the use of valid and suitable techniques to estimate the exposure of employees to a hazard.
Musculoskeletal disorder (MSD)	An injury, illness or disease that arises in whole or part from manual handling in the workplace, whether occurring suddenly or over a prolonged period of time. (Does not include injuries caused by crushing, entrapment or cut resulting primarily from the mechanical operation of plant.
Occupational Overuse Syndrome (OOS)	Previously called RSI and refers to arrange of conditions characterised by persistent discomfort and pain in and around joints and associated with repeated movement of the joint. Recent State and Territory legislation tends to group these conditions with those arising from manual handling as Musculoskeletal Disorders.
OHS inspection	The process of physically examining and evaluating the extent to which hazards and risks exist, and/or particular OHS requirements, procedures or standards are being met. Refer also to <i>workplace inspection</i> .
OHS specialists	Include: <ul style="list-style-type: none"> • safety professionals • ergonomists • occupational hygienists • safety engineers • injury management advisors • health professionals.
Operator certification	The process by which a certificate to use or operate industrial equipment is issued by a certifying authority.
OHS management system (OHSMS)	That part of the organisation's overall management system that covers developing, implementing, reviewing and maintaining the activities for managing OHS. It is NOT a standard, a commercial package or folders on the shelf; however it may involve use of OHS management systems developed in the workplace to meet the OHS situation in that particular workplace. Also referred to in broader context as systematic approaches to managing OHS.
Operational controls for plant and equipment	Should: <ul style="list-style-type: none"> • be suitability identified

NOHSC term	Definition/Explanation
	<ul style="list-style-type: none"> • have nature and function clearly indicated • be readily and conveniently located • be guarded to prevent unintentional activation • be capable of locking in ‘off’ position to enable disconnection of all motive power and forces • be of ‘fail safe’ type.
Participative arrangements	<p>Are those arrangements that inform employees and other stakeholders of OHS matters, seek their input and offer opportunity for stakeholders to participate in decisions that may impact on their OHS. May also be referred to as <i>consultative arrangements</i>, however <i>participation</i> implies a higher level of involvement.</p>
Permit to work	<p>A written authority document such as hot work and confined space entry that:</p> <ul style="list-style-type: none"> • includes approval to undertake work and activities including tests, measurements and monitoring • is authorised by a responsible or designated person directly in control of the work • certifies appropriate precautions and controls to be followed • incorporates checklists, conditions and actions such as the frequency and duration of the work and atmospheric tests • follows recognised industry standard recording practices.
Plant	<p>As defined in National Standard for Plant includes:</p> <ul style="list-style-type: none"> • machinery, equipment (including scaffolding), appliance, implement or tool and any other component, fitting or accessory • fixed and or specified plant as cited in commonwealth, state and territory OHS legislation • mobile plant and load shifting equipment • pressure equipment such as boilers, pressure vessels and pressure piping • electrical installation and plant such as wiring, accessories, fittings, consuming devices, control and protective gear, converters and generators.
Plant Registration	<p>The administrative process by which a certifying authority or state OHS regulator requires an organisation or industry to register plant, machinery and equipment.</p>
Personal protective equipment (PPE)	<p>Equipment designed to be worn to provide protection from hazards, and may include:</p> <ul style="list-style-type: none"> • head protection • face and eye protection

NOHSC term	Definition/Explanation
	<ul style="list-style-type: none"> • respiratory protection • hearing protection • hand protection • clothing and footwear. • PPE is considered the least satisfactory control measure.
Policies and procedures	<p>Relevant to OHS include:</p> <ul style="list-style-type: none"> • policies and procedures underpinning OHS including those for hazard and incident reporting, OHS communication, consultation, issue resolution and risk management • quality system documentation • purchasing and contracting procedures • documents describing how tasks, projects, inspections, jobs and processes are to be undertaken • standard operating procedures, work instructions • job or batch sheets, recipes • operators manuals • employee and contractor handbooks • job/task statements.
Positive performance indicators	<p>Focus on assessing how successfully a workplace is performing through measuring OHS processes.</p>
(OHS) Records	<p>Requirements for OHS record keeping may be defined in:</p> <ul style="list-style-type: none"> • OHS legislation and regulations governing reporting of incidents and maintenance of records related to specific hazards, including chemical registers and material safety data sheets (MSDSs) • privacy legislation • organisational procedures <p>OHS records may include:</p> <ul style="list-style-type: none"> • hazard and incident reports, First Aid records • risk assessments • hazardous substances and dangerous good registers, MSDSs • risk registers • OHS audit and inspection reports • maintenance and testing records • OHS training records • outcomes of health surveillance and environmental monitoring • workers compensation claims and return to work records. <p>OHS records must be stored taking account of:</p> <ul style="list-style-type: none"> • privacy

NOHSC term	Definition/Explanation
	<ul style="list-style-type: none"> • confidentiality • enabling access to personal records, within legislative requirements • commercial in confidence issues as appropriate.
(OHS) Reporting requirements	Under legislation include serious injury and serious incident reporting to OHS authorities.
(OHS) Responsibilities	<p>Those with legislated OHS responsibilities include:</p> <ul style="list-style-type: none"> • company director • manager • supervisors • OHS representatives • employees and contractors • designers, manufacturers, installers, suppliers.
Residual risk	That risk that is unable to be designed out of a product or process.
Risk	<p>The chance of something occurring that will result in injury or damage. It is measured in terms of consequences (injury or damage) and likelihood of the consequence.</p> <p>Refer also to <i>Consequence</i> and <i>Likelihood</i>.</p>
Risk analysis	<p>Analysing the risk to:</p> <ul style="list-style-type: none"> • identify factors influencing the risk and the range of potential consequences • effectiveness of existing controls • likelihood of each consequence considering exposure and hazard level • combining these in some way to obtain a level of risk. • Factors influencing the risk may be associated with: <ul style="list-style-type: none"> • equipment • work environment/organisation • task • the individual/operator • frequency and duration of exposure • number of people exposed/involved.
Risk assessment	<p>Risk assessment is a two-step process that involves risk analysis and risk evaluation. Risk assessment as required under various OHS legislation does not necessarily require this second step of evaluation.</p> <p>Refer also to <i>Risk Analysis</i> and <i>Risk evaluation</i>.</p>

NOHSC term	Definition/Explanation
Risk evaluation	Comparison of risk with pre-established criteria for tolerance (or as low as reasonably achievable) and the subsequent ranking of risks requiring control. This activity will usually be carried out by or in conjunction with others with advanced OHS skills and knowledge.
Risk management	The whole systematic process directed towards identifying hazards, assessing the risk and developing controls to minimise the risk and monitoring the effectiveness of the controls (and taking further action as required).
Risk ranking	A process of rating risks according to their severity and likelihood. Common systems are based on matrices or nomograms but are usually highly subjective.
Risk register	Includes: <ul style="list-style-type: none"> • a list of hazards, their location and people exposed • a range of possible scenarios or circumstances under which these hazards may cause injury or damage • the results of the risk assessment, and may also include; • possible control measures and dates for implementation. <p>May also be referred to as <i>Hazard Register</i>.</p>
Safe Design	A design process that generates options to eliminate hazards, or minimise potential risk to health and safety of those who make the product and those that use it by involving decision makers and considering OHS risks throughout the life cycle of the designed product.
Stakeholders	In workplace OHS include: <ul style="list-style-type: none"> • managers • supervisors • health and safety and other employee representatives • OHS committees • employees and contractors • the community.
Standards	Relevant to OHS include: <ul style="list-style-type: none"> • OHS regulations and standards developed by OHS regulators • national standards (NOHSC) • Australian standards • International national standards • industry standards • codes of practice

NOHSC term	Definition/Explanation
	<ul style="list-style-type: none"> • exposure standards • guidance notes.
Statute Law	Law created by legislation passed by government (acts and regulations) as distinct from common law.
(OHS) plan	<p>A document that:</p> <ul style="list-style-type: none"> • is usually developed annually but may be developed for a shorter or longer period • is reviewed regularly • has OHS performance indicators (i.e. objectives and targets that are achievable and practical) reflecting systematic approaches to managing OHS.
System of work	<p>The overall process of work including:</p> <ul style="list-style-type: none"> • method by which the work is carried out • organisation of the work • selection and maintenance of tools and equipment • supervision and training • selection of workers • allocation of tasks and responsibilities.
Systemic approach to managing OHS	<p>Requires:</p> <ul style="list-style-type: none"> • comprehensive processes that are combined in a methodical and ordered manner to minimise the risk of injury or ill health in the workplace • processes of planning, allocation of resources, communication and consultation, hazard management, record keeping and reporting, training and competency, and review and evaluation for ongoing improvement. <p>Factors that may impact on the implementation of a systematic approach to managing OHS may include:</p> <ul style="list-style-type: none"> • barriers to communication, such as language/literacy • workplace culture issues, such as management commitment, supervisors' approach to compliance and general acceptance of the priority of safety • diversity of workers • structural factors, such as multiple locations, shift work and supervisory arrangements.
Tag out	Refer to <i>Isolation</i> .
Technical advisors	To the OHS function may include:

NOHSC term	Definition/Explanation
	<ul style="list-style-type: none"> • legal practitioners • engineers (such as design, acoustic, mechanical, civil) • security and emergency response personnel • workplace trainers and assessors • maintenance and trade persons.
Wellness	Refer to <i>Health promotion</i> .
Workplace policies	Comprise written statements of employer's intentions and how the employers will action those intentions in the workplace. For example: OHS, access and equity, discrimination and manual handling.
Workplace inspection	Process of examining the workplace, usually with the aid of a checklist, to identify hazards and level of compliance with workplace procedures.

Some terms in the glossary have been taken from, or modified from the CCH Occupational Health and Safety Glossary, 1992 and National Guidelines for Integrating OHS Competencies into National Industry Competency Standards [NOHSC: 7025

2.2.01 Contextualisation

Contextualisation

In the competency standard units, "notes" have been placed against respective aspects that include scope, Performance Criteria, Range Statement and essential knowledge and associated skills and other related sections. The insertion of these "notes" is primarily to provide users and support material developers with examples of the form and type related to technical content principles, technology, equipment, or processes that may be used to cover the outcomes. The examples should be treated as information that adds clarity for the purposes of assisting in guidance of the depth and breadth that is to be covered.

As the type, form, process, or technique of technology and equipment may change it is therefore expected and encumbered on RTOs to continue to be current in the content of their delivery arrangements.

It is therefore appropriate for RTOs to use the notes in relation to technology and equipment references as advisory information. In these instances RTOs should aim to accommodate the adoption of improved and new technologies in the scope/range and essential knowledge and associated skills of the competency standard units by varying the context examples given in the referenced 'Notes:' to the Performance criteria, Range statement and Essential knowledge and associated skills. However, the contextualisation must not be such that the outcome of the competency standard units is altered in any way.

Where contextualisation of the notes varies the outcome of the competency standard units and its related content, RTOs should consult with EE-Oz Training Standards to explore options for incorporating and/or covering the new arrangements, so that currency of the Training package is maintained.

It should be noted that any need to alter the competency standard units from its intended outcome requires a new or varied competency standard unit. Such changes are to be undertaken through the continuous improvement processes required of Training Packages, which in relation to this Training Package is managed by EE-Oz Training Standards.

2.3.1 Language, Literacy and Numeracy

Volume 2 Part 3

3.1 Language, Literacy and Numeracy

The reading, writing and numeracy skills/competencies in each Competency Standard Unit describe the recommended pre-requisite entry requirements typically needed to successfully achieve the competency. A nationally-recognised language, literacy and numeracy framework has been used to provide advice as to the relevant entry level required.

The information has been derived from the National Reporting System report, *A mechanism for reporting outcomes of adult English language, literacy and numeracy programs*. The Australian National Training Authority (ANTA) and the Department of Employment Education and Training (DEET), 1994-5, jointly funded the report. Australian Training Products Ltd (ATP) distributes it for and on behalf of Language Australia Victorian Office. Stock code 3010A, ISBN: 0 7306 7493 2, April 1999.

The report:

- identifies adult English language, literacy and numeracy competencies in industry
- facilitates student pathways
- generates ideas for curriculum and assessment.

The report identifies a national framework of five vertical levels of competence related to complexity of language, literacy and numeracy competence. Six interrelated horizontal aspects of communication were found to apply in relation to differing orientations of social activity involving reading, writing, speaking, listening and/or numeracy. These were categorised as:

- procedural communication for performing tasks
- technical communication for using technology
- personal communication for expressing identity
- cooperative communication for interacting in groups
- systems communication for interacting in organisations
- public communication for interacting in the wider community.

The National Reporting System report should be referred to at all times for clarification, more detailed information and advice.

For the purposes of this Training Package writing, reading and numeracy competencies, have been selected from the five-level competence structure (using the Technical Communication aspect of the national framework), as a means of providing relevant entry-level advice. Registered Training Organisations should use this information to assist them in developing appropriate entry-level learning strategies and to assist learners to meet the entry-level requirements of respective Competency Standard Units.

Table 6 – Reading, Writing and Numeracy: Indicators of Competence

Note: It is important to note what the five levels of competence interrelated with six aspects of communication of the National Reporting System is not intended to be. It is not an assessment system. It is not curriculum. It is not a model of language acquisition. It is not a means for categorising students by a simple "level", nor is it a set of broad competency statements. It is not a recruitment instrument for employers. The NRS suggests that the *"report of a person's competence derives from the interplay between the chosen activity, the features of the text/task, and the context and level of support under which the activity is performed"*.

Reading

Scale	IoC*	Indicators of Competence	Technical Communication
5	5.1 5.2 5.3	<p>Reads and interprets structurally intricate texts in chosen fields of knowledge and across a number of genres, which involve complex relationship between pieces of information and/or propositions.</p> <p>Interprets subtle nuances, infers purpose of author and makes judgements about the quality of an argument.</p> <p>Reads and critically evaluates texts containing data which includes some abstraction, symbolism, and technicality presented in graphic, diagrammatic, formatted or visual form.</p>	<p>Defines the purpose and objectives for the use of a particular technology, e.g. writes a report, which includes a detailed analysis of technology as, applied in a particular workplace or environment.</p> <p>Draws on prior knowledge of the application of technology in researching the capacity of a new system, e.g. writes a briefing and recommends purchase or use of a particular system.</p> <p>Uses technological principles to reduce constraints presented by environmental or physical capacity, e.g. writes a report, which compares the effectiveness and efficiency of manual and computerised record management systems.</p> <p>Prepares a written or oral report, which critically evaluates the content, structure, and purpose of technical texts including graphic, diagrammatic or numerical information.</p> <p>Adapts task instructions to suit changes in technology, e.g. writes plain English instructions for the operation of a new machine based on the manufacturer's instructions.</p> <p>Draws from a number of sources and uses computer skills to prepare a report, e.g. CV and job application letter.</p>
4	4.1	Reads and interprets structurally	Compares and contrasts views on

Scale	IoC*	Indicators of Competence	Technical Communication
	4.2	<p>intricate texts in chosen fields of knowledge which require integration of several pieces of information for generating meaning.</p> <p>Interprets texts, which include ambiguity, and inexplicitness where reader needs to distinguish fact from opinion and infer purpose.</p> <p>Interprets and extrapolates from texts containing data which includes some abstraction, symbolism, and technicality presented in graphic, diagrammatic, formatted or visual form.</p>	<p>technology in newspaper articles.</p> <p>Interprets the purposes and objectives for the use of technology after the reading a brochure or manual.</p> <p>Selects technological practices to conform with the guidelines for health and safety, environmental impact and ethical practice, and uses them within those guidelines.</p> <p>Uses guidelines to ensure technological equipment is used to its full capacity.</p> <p>Uses a computer to prepare a typed report from a hand-drafted report.</p> <p>Compares and contrasts different technologies and their impact, e.g. argues the case for new practices when using new technologies, reports on the effects of installation of new machinery.</p> <p>Writes a report on the impact of a particular technology for a specific audience, e.g. management committees, tri-partite committees.</p> <p>Reads a complex diagram to identify components and procedures for dealing with a technical fault or breakdown.</p>
3	3.1 3.2 3.3	<p>Reads and interprets texts of some complexity, integrating (where relevant) a number of pieces of information in order to generate meaning.</p> <p>Displays awareness of purpose of text, including unstated meaning.</p> <p>Interprets and extrapolates from texts containing data which is unambiguously presented in graphic, diagrammatic, formatted or visual form.</p>	<p>Reads a technical manual where the information is supported by diagrams, sufficiently well to be able to locate and comprehend particular information required, e.g. programs a VCR to record two programs in advance.</p> <p>Uses the author, title, key word and other search indexes of a library computer.</p> <p>Comprehends short summary information on computer-managed learning packages to choose a relevant package to suit own needs.</p> <p>Uses the word processing program on a computer to produce texts.</p> <p>Writes simple instructions for using familiar technology, e.g. how to use an</p>

Scale	IoC*	Indicators of Competence	Technical Communication
			<p>automatic teller machine.</p> <p>Completes a formatted workplace test, e.g. damage or breakdown report.</p> <p>Writes a brief report on uses of technology, e.g. for classroom, workplace, domestic or community purposes.</p>
2	2.1 2.2	<p>Reads and interprets short simple texts on a personally relevant topic.</p> <p>Locates specific information relating to familiar contexts in a text which may contain data in simple graphic, diagrammatic, formatted or visual form.</p>	<p>Reads short, relevant, explicit, clearly formatted texts related to technology, e.g. the author and title index of a library computer.</p> <p>Chooses a computer assisted learning package, having read short descriptions of one or two programs, to acquire a defined skill or area of knowledge.</p> <p>Writes a short description, e.g. describes a damaged part of a machine to facilitate repair.</p> <p>Extracts information from a list with language and numeracy components, e.g. price lists of components for computer systems.</p> <p>Records simple and routine information using the telephone, e.g. takes a phone message, on a form designed for this purpose.</p> <p>Interprets instructions, which combine pictorial and written information, e.g. directions on how to operate a piece of machinery safely.</p>
1	1.1 1.2	<p>Reads and identifies letter of the alphabet in the context of whole words, numbers, signs and symbols relating to personal details and immediate environment.</p> <p>Identifies specific information in a personally relevant text with familiar content, which may include personal details, location or calendar information in simple graphic, diagrammatic, formatted or visual</p>	<p>Recognises very short, explicit, pictorial texts, e.g. understands logos related to worker safety before using a piece of machinery, reads letters on a keyboard.</p> <p>Reads graphic instructions accompanying a new piece of technology to learn new information or skills about a technology or medium, e.g. uses an automatic teller machine by following instructions given graphically on the screen.</p> <p>Types own name or single words into a</p>

Scale	IoC*	Indicators of Competence	Technical Communication
		form.	computer-assisted learning program.

Note: IoC* - Indicators of Competency sub-level

Writing

Scale	IoC*	Indicators of Competence	Technical Communication
5	5.4 5.5	<p>Demonstrates well-developed writing skills by selecting stylistic devices to express complex relationships between ideas and purposes.</p> <p>Generates complex written texts with control over generic structure.</p>	<p>Defines the purpose and objectives for the use of a particular technology, e.g. writes a report, which includes a detailed analysis of technology as, applied in a particular workplace or environment.</p> <p>Draws on prior knowledge of the application of technology in researching the capacity of a new system, e.g. writes a briefing and recommends purchase or use of a particular system.</p> <p>Uses technological principles to reduce constraints presented by environmental or physical capacity, e.g. writes a report, which compares the effectiveness and efficiency of manual and computerised record management systems.</p> <p>Prepares a written or oral report, which critically evaluates the content, structure, and purpose of technical texts including graphic, diagrammatic or numerical information.</p> <p>Adapts task instructions to suit changes in technology, e.g. writes plain English instructions for the operation of a new machine based on the manufacturer's instructions.</p> <p>Draws from a number of sources and uses computer skills to prepare a report, e.g. CV and job application letter.</p>
4	4.4 4.5	<p>Communicates complex relationships between ideas by matching style of writing to purpose and audience.</p> <p>Generates written texts</p>	<p>Compares and contrasts views on technology in newspaper articles.</p> <p>Interprets the purposes and objectives for the use of technology after the reading a brochure</p>

Scale	IoC*	Indicators of Competence	Technical Communication
		reflecting a range of genres and using appropriate structure and layout.	<p>or manual.</p> <p>Selects technological practices to conform with the guidelines for health and safety, environmental impact and ethical practice, and uses them within those guidelines.</p> <p>Uses guidelines to ensure technological equipment is used to its full capacity.</p> <p>Uses a computer to prepare a typed report from a hand-drafted report.</p> <p>Compares and contrasts different technologies and their impact, e.g. argues the case for new practices when using new technologies, reports on the effects of installation of new machinery.</p> <p>Writes a report on the impact of a particular technology for a specific audience, e.g. management committees, tri-partite committees.</p> <p>Reads a complex diagram to identify components and procedures for dealing with a technical fault or breakdown.</p>

Note: IoC* - Indicators of Competency sub-level

Writing - continued

Scale	IoC*	Indicators of Competence	Technical Communication
3	3.4 3.5	<p>Communicates relationships between ideas through selecting and using grammatical structures and notations, which are appropriate to the purpose.</p> <p>Produces and sequences paragraphs according to purpose of text.</p>	<p>Reads a technical manual where the information is supported by diagrams, sufficiently well to be able to locate and comprehend particular information required, e.g. programs a VCR to record two programs in advance.</p> <p>Uses the author, title, key-word and other search indexes of a library computer.</p> <p>Comprehends short summary information on computer-managed learning packages to choose a relevant package to suit own needs.</p> <p>Uses the word processing program on a computer to produce texts.</p> <p>Writes simple instructions for using familiar technology, e.g. how to use an automatic teller</p>

Scale	IoC*	Indicators of Competence	Technical Communication
			<p>machine.</p> <p>Completes a formatted workplace test, e.g. damage or breakdown report.</p> <p>Writes a brief report on uses of technology, e.g. for classroom, workplace, domestic or community purposes.</p>
2	2.3 2.4	<p>Writes about a familiar topic using simple sentence structure and joining ideas through conjunctive links where appropriate.</p> <p>Completes forms or writes notes using factual or personal information relating to familiar contexts.</p>	<p>Reads short, relevant, explicit, clearly formatted texts related to technology, e.g. the author and title index of a library computer.</p> <p>Chooses a computer assisted learning package, having read short descriptions of one or two programs, to acquire a defined skill or area of knowledge.</p> <p>Writes a short description, e.g. describes a damaged part of a machine to facilitate repair.</p> <p>Extracts information from a list with language and numeracy components, e.g. price lists of components for computer systems.</p> <p>Records simple and routine information using the telephone, e.g. takes a phone message, on a form designed for this purpose.</p> <p>Interprets instructions, which combine pictorial and written information, e.g. directions on how to operate a piece of machinery safely.</p>
1	1.3 1.4 1.5	<p>Copies letters of the alphabet, numbers, and dates in order to convey personal details such as name, address, telephone number.</p> <p>Writes basic personal details about self or others such as name, address, and signature.</p> <p>Writes one or two phrases/simple sentences conveying an idea, message or opinion drawing from a modelled text.</p>	<p>Recognises very short, explicit, pictorial texts, e.g. understands logos related to worker safety before using a piece of machinery, reads letters on a keyboard.</p> <p>Reads graphic instructions accompanying a new piece of technology to learn new information or skills about a technology or medium, e.g. uses an automatic teller machine by following instructions given graphically on the screen.</p> <p>Types own name or single words into a computer-assisted learning program.</p>

Note: IoC* - Indicators of Competency sub-level

Numeracy

Scale	IoC*	Indicators of Competence	Technical Communication
5	5.10 5.11 5.12	<p>Interprets, selects and investigates appropriate mathematical information and relationships highly embedded in an activity, item or text.</p> <p>Selects and applies a wide range of mathematical strategies flexibly to generate solutions to problems across a broad range of contexts.</p> <p>Uses a wide range of oral and written informal and formal language and representation including symbols, diagrams and charts to communicate mathematically.</p>	<p>Calculates distance, length and location using the trigonometry and geometry of triangles in relevant situations, e.g. locates grid reference on a map for a boat travelling on an given bearing with time and speed specified; uses dimensions provided on a scaled plan of a roof to find the pitch or slope of the roof. Calculates quantities of materials to tile the roof applying a 4% allowance for wastage.</p> <p>Plans and gathers information on a negotiated topic from a variety of sources including government, industry and media about relevant community or workplace issues. Organises information by grouping. Graphically represents and analyses information for a particular purpose. Presents, individually or in a team, a report expressing a viewpoint, which is substantiated by discussion of supporting statistical evidence.</p> <p>Interprets and applies metric quantities and numbers in scientific notation, e.g. calculates the amount of oil in litres spilled from a tanker if it covers a surface area of water of approximately 1200 hectares ($1.2 \times 10^7 \text{m}^2$) to a thickness of $6 \times 10^3 \text{mm}$.</p> <p>Uses financial formulae, e.g. simple and compound interest to calculate and contrast the interest incurred in borrowing money from financial institutions.</p>
4	4.10 4.11 4.12	<p>Selects and investigates appropriate mathematical information and relationships embedded in an activity, item or text.</p> <p>Selects and applies an expanding range of mathematical strategies flexibly to solve problems in a variety of contexts.</p>	<p>Uses ratio and scale to interpret dimensions on a basic plan.</p> <p>Applies similarity and ratio to estimate and calculate lengths, e.g. finds height of a building, a tree.</p> <p>Compares quality and costs of using imported vs Australian tiles, discount vs brand name paints.</p> <p>Presents information in appropriate graphical format to show different interpretations and</p>

Scale	IoC*	Indicators of Competence	Technical Communication
	4.13	<p>Examines and questions the appropriateness, possible interpretations and implications of aspects of a mathematical activity.</p> <p>Uses a range of oral and written informal and formal language and representation including symbols, diagrams and charts to communicate mathematically.</p>	<p>influences, e.g. analysis of government spending on education.</p> <p>Applies formulae and interprets results relevant to a familiar practical situation, measuring the dimensions needed and substituting them into the formula, adjusting units where necessary, e.g. length of edging for circular garden or pond, capacity of a water tank or bath.</p> <p>Uses area and perimeter to calculate a range of options, e.g. given a certain length of fencing, plan a range of options for paddock dimensions, which meet specific area requirements.</p> <p>Calculates and contrasts monthly income from average sales, given a variety of salary options involving retainers and commission rates.</p>

Note: IoC* - Indicators of Competency sub-level

Numeracy - continued

Scale	IoC*	Indicators of Competence	Technical Communication
3	3.10	Selects appropriate mathematical information embedded in a real life activity, item or text.	Uses a distance scale to find the shortest route between two locations on a map and considers road terrain conditions in deciding preferred route.
	3.11	Selects and applies a range of mathematical strategies to solve problems in a number of contexts which are familiar and may be interrelated.	Expresses and calculates with metric quantities, e.g. interprets and costs quantities of cheese given different forms such as 350g, 0.35kg.
	3.12	Reflects on and questions reasonableness and appropriateness of the purpose, process and outcomes of a mathematical activity.	Measures common three-dimensional shapes, e.g. room, and represents the information on an appropriate diagram drawn to scale.
	3.13	Uses oral and written informal and formal language and representation including symbols and diagrams to communicate mathematically.	<p>Calculates with common, fractions and metric measurements, e.g. adjusts the quantities in a recipe by halving or doubling to obtain the required amount.</p> <p>Uses a variety of methods to analyse advertising by comparing savings on a number of different items, e.g. at 12% off, 15% off, 1/3 off, price reduced by \$10.</p>

Scale	IoC*	Indicators of Competence	Technical Communication
			Compares casual and permanent rates of pay over a given time span for work of the same nature.
2	2.9 2.10 2.11 2.12	<p>Locates relevant mathematical information in a familiar real life activity text.</p> <p>Selects and uses straightforward mathematical actions in familiar and predictable contexts.</p> <p>Uses estimation and prior experience to examine purpose and check reasonableness of the process and outcomes of a mathematical activity.</p> <p>Uses oral and written informal and formal language and representation some symbols and diagrams to communicate mathematically.</p>	Compares measurements taken with estimated lengths of familiar objects, e.g. estimates and measures storeroom dimensions.
1	1.10 1.11 1.12 1.13	<p>Locates simple key mathematical information in a familiar real life activity text.</p> <p>Recognises and uses straightforward mathematical actions which relate to immediate contexts.</p> <p>Uses rough estimation and prior experience to identify purpose and check reasonableness of the process and outcomes of a mathematical activity.</p> <p>Uses everyday informal oral language and representation including familiar symbols and diagrams to communicate mathematically.</p>	Estimates lengths of familiar objects using metric units, e.g. a person's height, height of doorway.

UET20312 Certificate II in ESI - Powerline Vegetation Control

Modification History

Release	Action	Core/Elective	Details	Points
2	Add	Elective	FPIHAR2206B – Operate a mobile chipper/mulcher	20

Description

Scope:

This qualification provides competencies for the operational role of planning and carrying out vegetation control at and above ground level near live electrical apparatus.

Encompassed is compliance with relevant Commonwealth, State and Territory regulation, local government legislation, applicable industry Guidelines, Codes of Practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements

The requirements for awarding this qualification are that the following are successfully achieved:

- All the Core competency standard units, and
- The required combination of Elective Units selected from Group A and/or Group B, where the sum of the weighting value of 120 points in accord with that assigned to this qualification and quantified below, and
- All the required prerequisite competency standard units have been met.
-

Core Units — All to be completed		Weighting Points
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures	40
UETTDREL14A	Working safely near live electrical apparatus as a non-electrical worker	40
AHCARB205A	Operate and maintain chainsaws	20
UETTDRCVC23A	Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus	60
UETTDRCVC27A	Monitor safety compliance of vegetation control work in an ESI environment	60
Total points in core		240

Elective Competency Standard Units

At least a weighting of 120 points to be achieved. Must achieve at least 50 points from Group B.

Group	Rules	Minimum points	Maximum points
A	<p>Imported and Common Elective Units</p> <p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 2. If units have not being assigned a weighting by the relevant EE-Oz Industry</p>	0	70

Elective Competency Standard Units			
At least a weighting of 120 points to be achieved. Must achieve at least 50 points from Group B.			
Group	Rules	Minimum points	Maximum points
	Technical Advisory Committee, their weighting will be 10 points.		
B	Qualification Electives You may select all your elective units from this Group	50	120

Group A Imported and Common Elective Units		Weighting Points
Achieve units up to 70 points for qualification completion		
TLILIC2005A	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	40
AHCMOM304A	Operate machinery and equipment	40
AHCARB202A	Fell Small Trees	30
AHCCHM201A	Apply chemicals under supervision	30
AHCARB204A	Undertake standard climbing techniques	20
AHCPCM201A	Recognise Plants	40
FPIHAR2206B	Operate a mobile chipper/mulcher	20
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 2. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	Up to 70 Points

Group B Qualification Elective Units		Weighting Points
At least 50 points to be achieved from this group for qualification completion. All electives may be completed from this group.		
UETDRVC21A	Use climbing techniques to cut vegetation above ground near live electrical apparatus	30
UETDRVC24A	Assess vegetation and recommend control measures in an ESI environment	80
UETDRVC25A	Use elevated platform to cut vegetation above ground level near live electrical apparatus	30
UETDRVC26A	Cut vegetation at ground level near live electrical apparatus	60
UETDRVC31A	Operate specialist equipment at ground level near live electrical apparatus	60
UETDRVC32A	Use specialised plant to cut vegetation above ground level near live electrical apparatus	30
UETDRVC33A	Apply pruning techniques to vegetation control near live electrical apparatus	50
UETDRVC34A	Undertake release and rescue from a tree near live electrical apparatus	20

Note:

1. Prerequisite pathways shall be identified and met for all elective units selected

END OF QUALIFICATION

Custom Content Section

Not applicable.

UET20412 Certificate II in Transmission Structure and Line Assembly

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	Group A	HLTCPR211A Perform CPR	10
2	Update	Group A	HLTFA311A Apply First Aid	10

3	Update	Group A	HLTAID001 Provide cardiopulmonary resuscitation	
3	Update	Group A	HLTADI003 Provide first aid	

Description

Scope:

Those gaining this qualification will be able to assemble ESI transmission towers and structures and stringing transmission overhead conductors prior to them being tensioned.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements:

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, and
- The required combination of Elective Units selected from Group A and/or Group B, where the sum of the weighting value of 200 points in accord with that assigned to this qualification and quantified below, and
- All the required prerequisite competency standard units have been met.

Core Units — All to be completed		Weighting Points
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures	40
UETTD RTP23A	Erect ESI transmission structures	100
Total points in core		160

Elective Competency Standard Units

At least a weighting of 200 points to be achieved. Must achieve at least 140 points from Group B

Group	Rules	Minimum points	Maximum points
A	Imported and Common Elective Units Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 2. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.	0	60
B	Qualification Electives You may select all your elective units from this Group	140	200

Group A	Weighting
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You may complete units to a maximum weighting of 60 points		Points
CPCCOHS1001A	Work safely in the construction industry	10
AHCMOM304A	Operate Machinery and Equipment	40
HLTAID003	Provide first aid	10
TLILIC2005A	Licence to operate a boom-type elevating work platform (boom length 11 meters or more)	40
HLTAID001	Provide cardiopulmonary resuscitation	10
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 2. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	Up to 60 Points

Group B		Weighting
At least 140 points to be achieved from this group		Points
You may select all your elective units from this Group		
UETTD RTP22A	Establish and reinstate an ESI transmission structure work site	80
UETTD RTP24A	Erect ESI transmission structure hardware	60
UETTD RTP25A	Pre-tension stringing ESI transmission overhead conductors and cables	80

Note:

1. Prerequisite pathways shall be identified and met for all elective units selected.

END OF QUALIFICATION

Custom Content Section

Not applicable.

UET20511 Certificate II in National Broadband Network Cabling (Electricity Supply Industry Assets)

Modification History

Release	Action	Core/Elective	Details	Points
3	Update	Group A	CPCCCM2007B Use explosive power tools	15
3	Update	Group A	HLTCPR211A Perform CPR	10

4	Update	Group A	HLTAID001 Provide cardiopulmonary resuscitation	
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Description

Scope

This qualification provides competencies to install and maintain national broadband network communications cabling following prescribed routines.

Pathways Information

Not Applicable

Licensing/Regulatory Information

Not Applicable

Entry Requirements

Not Applicable

Employability Skills Summary

Not Applicable

Packaging Rules

Completion requirements

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, **and**
- A combination of Elective competency standard units selected from Group A and/or Group B, to achieve a total weighting of 120 points, **and**
- All the required prerequisite competency standard units.

Core Competency Standard Units		Weighting Points
All Core competency standard units to be achieved		
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components	40
UEENEEE105A	Fix and secure electrotechnology equipment	20
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work	20
UEENEEK142A	Apply environmentally and sustainable procedures in the energy sector	20
UETTDREL14A	Working safely near live electrical apparatus as a non-electrical worker	40
UETTDRI81A	Install and maintain telecommunications infrastructure on electricity supply industry assets	80
Total points in core		240

Elective Competency Standard Units

Complete Elective units to achieve a total weighting of 120 points from the following groups:

Group	Rules	Minimum points	Maximum points

Elective Competency Standard Units			
Complete Elective units to achieve a total weighting of 120 points from the following groups:			
Group	Rules	Minimum points	Maximum points
A	<p>Imported and Common Elective Units</p> <p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 2. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p>	0	60
B	<p>Qualification Electives</p> <p>You may select all your elective units from this Group</p>	60	120

Group A Complete units to a maximum weighting of 60 points		Weighting Points
CPCCCM2007B	Use explosive power tools	15
TLID3035A	Operate a boom type elevating work platform	30
TLILIC2005A	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	30
CPCCOHS1001A	Work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
RIIOHS202A	Enter and work in confined spaces	30
RIIOHS204A	Work safely at heights	20
RIIOHS205A	Control traffic with stop-slow bat	10
UEENEEC001B	Maintain documentation	20
UEENEEC008B	Receive and store materials and equipment for electrotechnology work	20
UEENEEC010B	Deliver a service to customers	20

	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 2. If units have not being assigned a weighting in the ESI Transmission, Distribution and Rail Training Package, their weighting will be 10 points.</p> <p>Note: For further information see <i>Transition to NQC Packaging Rules for Flexibility</i>, Page 21, UET09 ESI Transmission, Distribution and Rail Training Package, Version 2.2, Volume 1 Preliminary Information.</p>	Up to 60 points
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Group B Qualification Electives. At least 60 points to be achieved from this group. You may select all your elective units from this Group.		Weighting Points
ICTCBL2065A	Splice and terminate optical fibre cable for carriers and service providers	40
ICTCBL2068A	Install a telecommunications service to a building	60
UEENEEE103A	Solve problems in ELV single path circuits	40
UEENEEE104A	Solve problems in d.c. circuits	40
UEENEEE151A	Transport apparatus, equipment and materials	60
UEENEEF106A	Solve problems in voice and data communications circuits	40
UEENEEF107A	Set up and configure the wireless capabilities of communications and data storage devices	40
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus	40

UET20612 Certificate II in ESI — Asset Inspection

Modification History

Not applicable.

Description

Scope:

Those gaining this qualification will be able to safely comply with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry Guidelines/Codes of Practices or other related requirements while inspecting and treating poles and inspecting live electrical apparatus.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements:

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, defined in the Core Competency Standard Units table below and
- A combination of Elective competency standard units to achieve a total weighting of 140 points in accordance with the Elective Competency Standard Units table below.
- All the required prerequisite competency standard units have been met.

Core Units — All to be completed		Weighting Points
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures	40
UETTDREL14A	Working safely near live electrical apparatus as a non-electrical worker	40
UETTDREL17A	Operate asset inspection plant, machinery and equipment near live electrical apparatus	40
UETTDREL18A	Inspect and treat poles and inspection of electrical apparatus	40
UETTDREL19A	Identify and interpret characteristics of electrical apparatus associated with power industry assets	40
Total points in core		220

Elective Competency Standard Units

At least a weighting of 140 points to be achieved. Must achieve at least 80 points from Group B

Group	Rules	Minimum points	Maximum points
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A	<p>Imported and Common Elective Units</p> <p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 2. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	0	60
B	<p>Qualification Electives</p> <p>You may select all your elective units from this Group</p>	80	140

Group A You may complete units to a maximum weighting of 60 points		Weighting Points
CPCCOHS1001A	Work safely in the construction industry	10
MEM16012A	Interpret technical specification and manuals	40
MEM17003A	Assist in the provision of on the job training	20
UEENEEC001B	Maintain documentation	20
UEENEEC010B	Deliver a service to customers	20
UEENEED101A	Use computer applications relevant to a workplace	20
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 2. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector</p>	Up to 60 Points

	Training Package, Version 1, Volume 1 Qualification Framework.	
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Group B At least 80 points to be achieved from this group You may select all your elective units from this Group		Weighting Points
UETTDREL20A	Undertake minor vegetation control and routine minor maintenance of poles and electrical apparatus	40
UETTDREL21A	Operate specialised data information equipment near live electrical apparatus	40
UETTD RVC23A	Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus	60
UETTD RVC27A	Monitor safety compliance of vegetation control work in an ESI environment	60

Note:

1. Prerequisite pathways shall be identified and met for all elective units selected.

END OF QUALIFICATION

Custom Content Section

Not applicable.

UET30512 Certificate III in ESI - Power Systems - Transmission Overhead

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	Core	Update name of unit UEENEEE102A Fabricate, assemble and dismantle utilities industry components	40

3	Remove	Group A	TLIC3003A Drive medium rigid vehicle	20
3	Remove	Group A	TLIC3004A Drive heavy rigid vehicle	20
3	Add	Group A	TLILIC2015B Licence to drive medium rigid vehicle	20
3	Add	Group A	TLILIC2016B Licence to drive heavy rigid vehicle	20

Description

Scope:

Those gaining this qualification will be able to acquire the skills and knowledge needed for a career in the Electricity Supply Industry. The scope of this qualification covers:
Transmission overhead powerline industry such as erection of towers, poles, structures and associated hardware including the installation and maintenance of conductors and cables.
Inspection procedures for overhead structures and electrical apparatus are also included.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, defined in the Core Competency Standard Units table below and
- A combination of Elective competency standard units to achieve a total weighting of 220 points in accordance with the Elective Competency Standard Units table below.
- All the required prerequisite competency standard units have been met.

Core Units — All must be achieved		Weighting Points
CPCCLDG3001A	Licence to perform dogging	20
CPCCLRG3001A	Licence to perform rigging basic level	40
TLILIC2005A	License to Operate a Boom Type Elevating Work Platform (Boom Length 11 Metres or more)	40
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	40
UEENEEE104A	Solve problems in d.c. circuits	80
UEENEEE105A	Fix and secure electrotechnology equipment	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications	40
UEENEEG101A	Solve problems in electromagnetic devices and related circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits	80
UETTDREL11A	Apply sustainable energy and environmental procedures	20
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus	40
UETTDREL16A	Working safely near live electrical apparatus	20
UETTDRLS54A	Install and maintain poles, structures, overhead conductors and cables	60
UETTDRTTP26A	Erect power systems transmission structures and associated hardware	60
UETTDRTTP27A	Maintain power systems transmission structures and associated hardware	60

UETTD RTP29A	Install and maintain overhead transmission conductors and cables	60
UETTD RTP30A	Inspect overhead structures and electrical apparatus	40
UETTD RTP99A	Test and verify transmission overhead installations	40
Total points in core		840

Elective Competency Standard Units		
Complete Elective units to achieve a total of weighting of 220 points from the following groups:		
Group	Minimum points	Maximum points
A Imported and Common Elective Units Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 3. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.	0	70
B Qualification Electives You may select all your elective units from this Group	160	220

Group A – Imported and Common Elective Units		Weighting Points
You may complete units to a maximum weighting of 60 points		
CPCCLHS3001A	Licence to operate a personnel and materials hoist	10
CPCCLHS3002A	Licence to operate a materials hoist	10
CPCCLRG3002A	Licence to perform rigging intermediate level	60
CPCCLSF2001A	Licence to erect, alter and dismantle scaffolding basic level	20
CPCCLSF3001A	Licence to erect, alter and dismantle scaffolding intermediate level	20
AHCARB205A	Operate and maintain chainsaws	20
TLILIC2001A	Licence to operate a forklift truck	40

TLILIC2015B	Licence to drive medium rigid vehicle	20
TLILIC2016B	Licence to drive heavy rigid vehicle	20
TLILIC4011A	Licence to operate a slewing mobile crane (over 100 tonnes)	70
TLILIC0012A	License to operate a vehicle loading crane (Capacity 10 metre tonnes and above)	40
TLILIC3003A	Licence to operate a bridge and gantry crane	70
TLILIC3008A	Licence to operate a slewing mobile crane (up to 20 tonnes)	70
TLILIC4009A	Licence to operate a slewing mobile crane (up to 60 tonnes)	70
UEENEEE108A	Lay wiring/cablings and terminate accessories for ELV circuits	40
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits	40
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 3. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	Up to 70 Points

Group B – Qualification Electives		Weighting Points
Complete units to at least 160 points from this group. You may select all your elective units from this Group.		
UETTDRDP11A	Inspect overhead poles/structures and electrical apparatus	50
UETTDRDP12A	Maintain overhead energised low voltage conductors and cables	60
UETTDRIS41A	Install network infrastructure electrical equipment	60
UETTDRIS42A	Maintain network infrastructure electrical equipment	60
UETTDRIS43A	Perform low voltage field switching operation to a given schedule.	50
UETTDRIS44A	Perform HV field switching operation to a given schedule	50
UETTDRIS52A	Install and maintain poles, structures and associated hardware	50
UETTDRIS53A	Install and maintain power system public lighting	40
UETTDRIS56A	Install and maintain low voltage overhead services	40
UETTDRIS57A	Conduct visual checking and treatment of power system poles and structures	30
UETTDRIS61A	Install mobile generation set for synchronised LV Genset	50
UETTDRSB39A	Perform power system substation switching operation to a given schedule	50
UETTDRVC29A	Control vegetation whilst performing linework	40

Note:

1. Prerequisite pathways shall be identified and met for all elective units selected.
2. In selecting elective units considerations to career planning advice should be given to units that form part of a prerequisite pathway for the progression to achieve particular competencies or qualification at a higher level.

END OF QUALIFICATION

Custom Content Section

Not applicable.

UET30612 Certificate III in ESI - Power Systems - Distribution Overhead

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	Core	Update name of unit UEENEEE102A Fabricate, assemble and dismantle utilities industry components	40

3	Remove	Group A	TLIC3003A Drive medium rigid vehicle	20
3	Remove	Group A	TLIC3004A Drive heavy rigid vehicle	20
3	Add	Group A	TLILIC2015B Licence to drive medium rigid vehicle	20
3	Add	Group A	TLILIC2016B Licence to drive heavy rigid vehicle	20
3	Add	Group B	UETTDRIS55A Install and maintain low voltage underground services	40

Description

Scope

Those gaining this qualification will be able to acquire the skills and knowledge needed for a career in the Electricity Supply Industry. The scope of this qualification covers: Distribution overhead powerline industry such as installation, maintenance and inspection poles, structures and associated hardware used on poles and structures. The work also encompasses the installation and maintenance of electrical equipment, conductors and cables used in the powerline industry. The use of support plant and equipment to undertake these tasks and environmental concerns also play a part in this job function.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, defined in the Core Competency Standard Units table below and
- A combination of Elective competency standard units to achieve a total weighting of 140 points in accordance with the Elective Competency Standard Units table below.
- All the required prerequisite competency standard units have been met.

Core Units — All to be achieved		Weighting Points
CPCCLDG3001A	Licence to perform dogging	20
AHCARB205A	Operate and maintain chainsaws	20
TLILIC2005A	License to Operate a Boom Type Elevating Work Platform (Boom Length 11 Metres or more)	40
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	40
UEENEEE104A	Solve problems in d.c. circuits	80
UEENEEE105A	Fix and secure electrotechnology equipment	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications	40
UEENEEG101A	Solve problems in electromagnetic devices and related circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits	80
UETTDRDP11A	Inspect overhead poles/structures and electrical apparatus	50
UETTDRDP12A	Maintain overhead energised low voltage conductors and cables	60
UETTDRDP99A	Test and verify distribution overhead installations	40
UETTDREL11A	Apply sustainable energy and environmental procedures	20
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus	40
UETTDREL16A	Working safely near live electrical apparatus	20

UETTDNIS41A	Install network infrastructure electrical equipment	60
UETTDNIS42A	Maintain network infrastructure electrical equipment	60
UETTDNIS52A	Install and maintain poles, structures and associated hardware	50
UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables	60
UETTDNIS56A	Install and maintain low voltage overhead services	40
Total points in core		920

Elective Competency Standard Units			
Complete Elective units to achieve a total of weighting of 140 points from the following groups:			
Group		Minimum points	Maximum points
A	Imported and Common Elective Units Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 3. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.	0	70
B	Qualification Electives You may select all your elective units from this Group	80	140

Group A – Imported and Common Elective Units		Weighting Points
You may complete units to a maximum weighting of 60 points		
CPCCLHS3001A	Licence to operate a personnel and materials hoist	10
CPCCLHS3002A	Licence to operate a materials hoist	10
CPCCLRG3001A	Licence to perform rigging basic level	40
CPCCLRG3002A	Licence to perform rigging intermediate level	60
CPCCLSF2001A	Licence to erect, alter and dismantle scaffolding	20

	basic level	
CPCCLSF3001A	Licence to erect, alter and dismantle scaffolding intermediate level	20
TLILIC2001A	Licence to operate a forklift truck	40
TLILIC2015B	Licence to drive medium rigid vehicle	20
TLILIC2016B	Licence to drive heavy rigid vehicle	20
TLILIC4011A	Licence to operate a slewing mobile crane (over 100 tonnes)	70
TLILIC0012A	License to operate a vehicle loading crane (Capacity 10 metre tonnes and above)	40
TLILIC3003A	Licence to operate a bridge and gantry crane	70
TLILIC3008A	Licence to operate a slewing mobile crane (up to 20 tonnes)	70
TLILIC4009A	Licence to operate a slewing mobile crane (up to 60 tonnes)	70
UEENEEE108A	Lay wiring/cabling and terminate accessories for ELV circuits	40
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits	40
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 3. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	Up to 70 Points

Group B - Qualification Electives.		Weighting Points
Complete units to at least 80 points from this group. You may select all your elective units from this Group.		
UETTDRIS43A	Perform low voltage field switching operation to a given schedule.	50
UETTDRIS44A	Perform HV field switching operation to a given schedule	50
UETTDRIS53A	Install and maintain power system public lighting	40
UETTDRIS55A	Install and maintain low voltage underground services	40
UETTDRIS57A	Conduct visual checking and treatment of power system poles and structures	30
UETTDRIS60A	Install and replace power system energy meters and associated equipment	50
UETTDRIS61A	Install mobile generation set for synchronised LV Genset	50
UETTDRSB39A	Perform power system substation switching operation to a given schedule	50
UETTDRVC29A	Control vegetation whilst performing linework	40

Note:

1. Prerequisite pathways shall be identified and met for all elective units selected.
2. In selecting elective units considerations to career planning advice should be given to units that form part of a prerequisite pathway for the progression to achieve particular competencies or qualification at a higher level.

END OF QUALIFICATION

Custom Content Section

Not applicable.

UET30712 Certificate III in ESI - Power Systems - Rail Traction

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	Core	Update name of unit UEENEEE102A Fabricate, assemble and dismantle utilities industry components	40
2	Update	N/A	Amend elective units to be maximum 70 Group A points and minimum 120 Group B points.	

3	Remove	Group A	TLIC3003A Drive medium rigid vehicle	20
3	Remove	Group A	TLIC3004A Drive heavy rigid vehicle	20
3	Add	Group A	TLILIC2015B Licence to drive medium rigid vehicle	20
3	Add	Group A	TLILIC2016B Licence to drive heavy rigid vehicle	20

Description

Scope

Those gaining this qualification will be able to acquire the skills and knowledge needed for a career in the Electricity Supply Industry. The scope of this qualification covers:
Rail Traction industry such the installation, maintenance and inspection of overhead poles/structures, conductors and cables and rail traction wiring systems including associated equipment used on these structures. The installation and maintenance of the overhead traction configuration and the installation and maintenance of bonds as well as the operation of the rail traction height access equipment is also included in this job function.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, defined in the Core Competency Standard Units table below and
- A combination of Elective competency standard units to achieve a total weighting of 190 points in accordance with the Elective Competency Standard Units table below.
- All the required prerequisite competency standard units have been met.

Core Units — All to be achieved		Weighting Points
CPCCLDG3001A	Licence to perform dogging	20
AHCARB205A	Operate and maintain chainsaws	20
TLILIC2005A	License to Operate a Boom Type Elevating Work Platform (Boom Length 11 Metres or more)	40
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	40
UEENEEE104A	Solve problems in d.c. circuits	80
UEENEEE105A	Fix and secure electrotechnology equipment	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications	40
UEENEEG101A	Solve problems in electromagnetic devices and related circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits	80
UETTDREL11A	Apply sustainable energy and environmental procedures	20
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus	40
UETTDREL16A	Working safely near live electrical apparatus	20
UETTD RIS52A	Install and maintain poles, structures and associated hardware	50
UETTD RIS54A	Install and maintain poles, structures, overhead conductors and cables	60

UETDRRT21A	Install traction overhead wiring systems	50
UETDRRT22A	Maintain traction overhead wiring systems	60
UETDRRT27A	Install overhead traction components and equipment	50
UETDRRT28A	Maintain overhead traction components and equipment	60
UETDRRT99A	Test and verify rail traction installations	40
Total points in core		870

Elective Competency Standard Units

Complete Elective units to achieve a total of weighting of 190 points from the following groups:

Group		Minimum points	Maximum points
A	<p>Imported and Common Elective Units</p> <p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 3. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p>	0	70
B	<p>Qualification Electives</p> <p>You may select all your elective units from this Group</p>	120	190

Group A – Imported and Common Elective Units

You may complete units to a maximum weighting of 70 points

		Weighting Points
CPCCLHS3001A	Licence to operate a personnel and materials hoist	10
CPCCLHS3002A	Licence to operate a materials hoist	10
CPCCLRG3001A	Licence to perform rigging basic level	40
CPCCLRG3002A	Licence to perform rigging intermediate level	60
CPCCLSF2001A	Licence to erect, alter and dismantle scaffolding basic level	20
CPCCLSF3001A	Licence to erect, alter and dismantle scaffolding	20

	intermediate level	
TLILIC2001A	Licence to operate a forklift truck	40
TLILIC2015B	Licence to drive medium rigid vehicle	20
TLILIC2016B	Licence to drive heavy rigid vehicle	20
TLILIC4011A	Licence to operate a slewing mobile crane (over 100 tonnes)	70
TLILIC0012A	License to operate a vehicle loading crane (Capacity 10 metre tonnes and above)	40
TLILIC3003A	Licence to operate a bridge and gantry crane	70
TLILIC3008A	Licence to operate a slewing mobile crane (up to 20 tonnes)	70
TLILIC4009A	Licence to operate a slewing mobile crane (up to 60 tonnes)	70
UEENEEE108A	Lay wiring/cabbling and terminate accessories for ELV circuits	40
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits	40
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 3. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	Up to 70 Points

Group B - Qualification Electives		Weighting Points
<p>Complete units to at least 120 points from this group. You may select all your elective units from this Group.</p>		
UETTDNDP11A	Inspect overhead poles/structures and electrical apparatus	50
UETTDNDP12A	Maintain overhead energised low voltage conductors and cables	60
UETTDNIS41A	Install network infrastructure electrical equipment	60
UETTDNIS42A	Maintain network infrastructure electrical equipment	60
UETTDNIS43A	Perform low voltage field switching operation to a given schedule.	50
UETTDNIS44A	Perform HV field switching operation to a given schedule	50
UETTDNIS57A	Conduct visual checking and treatment of power system poles and structures	30
UETTDNIS61A	Install mobile generation set for synchronised LV Genset	50
UETTDNRT23A	Install rail traction bonds	40
UETTDNRT24A	Maintain rail traction bonds	50
UETTDNRT25A	Install overhead rail traction configurations	50
UETTDNRT26A	Maintain overhead rail traction configurations	60
UETTDNRT29A	Operate rail road traction height access equipment.	20
UETTDNRT30A	Perform to a given schedule rail traction switching operations	50
UETTDNRSB39A	Perform power system substation switching operation to a given schedule	50
UETTDNRT26A	Erect power systems transmission structures and associated hardware	60
UETTDNRT27A	Maintain power systems transmission structures and associated hardware	60
UETTDNRT29A	Install and maintain overhead transmission conductors and cables	60
UETTDNRT30A	Inspect overhead structures and electrical apparatus	40
UETTDNVC29A	Control vegetation whilst performing linework	40

Note:

1. Prerequisite pathways shall be identified and met for all elective units selected.
2. In selecting elective units considerations to career planning advice should be given to units that form part of a prerequisite pathway for the progression to achieve particular competencies or qualification at a higher level.

END OF QUALIFICATION

Custom Content Section

Not applicable.

UET30812 Certificate III in ESI - Power Systems - Distribution Cable Jointing

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	Core	Update name of unit UEENEEE102A Fabricate, assemble and dismantle utilities industry components	40
2	Update	N/A	Correct mathematical error in core unit weighting to match count. Adjusted elective units to be maximum 70 Group A points and minimum 190 Group B points.	

3	Remove	Group A	TLIC3003A Drive medium rigid vehicle	20
3	Remove	Group A	TLIC3004A Drive heavy rigid vehicle	20
3	Add	Group A	TLILIC2015B Licence to drive medium rigid vehicle	20
3	Add	Group A	TLILIC2016B Licence to drive heavy rigid vehicle	20

Description

Scope:

Those gaining this qualification will be able to acquire the skills and knowledge needed for a career in the Electricity Supply Industry. The scope of this qualification covers: Cable Jointing such as the laying, installation and maintenance of de-energised Low Voltage and High Voltage underground polymeric cables and the installation and maintenance of electrical equipment. Options are available for skills to be obtained for energised cables and or Low Voltage and High Voltage paper insulated cables.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, defined in the Core Competency Standard Units table below and
- A combination of Elective competency standard units to achieve a total weighting of 280 points in accordance with the Elective Competency Standard Units table below.
- All the required prerequisite competency standard units have been met.

Core Units — All to be completed		Weighting Points
CPCCLDG3001A	Licence to perform dogging	20
TLILIC2005A	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	40
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	40
UEENEEE104A	Solve problems in d.c. circuits	80
UEENEEE105A	Fix and secure electrotechnology equipment	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications	40
UEENEEG101A	Solve problems in electromagnetic devices and related circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits	80
UETTDRCJ21A	Lay ESI electrical cables	20
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.	50
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.	50
UETTDRCJ99A	Test and verify distribution cable jointing installations	40
UETTDREL11A	Apply sustainable energy and environmental procedures	20
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus	40

UETTDREL16A	Working safely near live electrical apparatus	20
UETTDNIS41A	Install network infrastructure electrical equipment	60
UETTDNIS42A	Maintain network infrastructure electrical equipment	60
UETTDNIS55A	Install and maintain low voltage underground services	40
Total points in core		800

Elective Competency Standard Units

Complete Elective units to achieve a total of weighting of 260 points from the following groups:

Group		Minimum points	Maximum points
A	Imported and Common Elective Units Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 3. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.	0	70
B	Qualification Electives You may select all your elective units from this Group	190	260

Group A – Imported and Common Elective Units		Weighting Points
You may complete units to a maximum weighting of 70 points		
CPCCLHS3001A	Licence to operate a personnel and materials hoist	10
CPCCLHS3002A	Licence to operate a materials hoist	10
CPCCLRG3001A	Licence to perform rigging basic level	40
CPCCLRG3002A	Licence to perform rigging intermediate level	60
CPCCLSF2001A	Licence to erect, alter and dismantle scaffolding basic level	20
CPCCLSF3001A	Licence to erect, alter and dismantle scaffolding intermediate level	20
AHCARB205A	Operate and maintain chainsaws	20

TLILIC2001A	Licence to operate a forklift truck	40
TLILIC2015B	Licence to drive medium rigid vehicle	20
TLILIC2016B	Licence to drive heavy rigid vehicle	20
TLILIC4011A	Licence to operate a slewing mobile crane (over 100 tonnes)	70
TLILIC0012A	License to operate a vehicle loading crane (Capacity 10 metre tonnes and above)	40
TLILIC3003A	Licence to operate a bridge and gantry crane	70
TLILIC3008A	Licence to operate a slewing mobile crane (up to 20 tonnes)	70
TLILIC4009A	Licence to operate a slewing mobile crane (up to 60 tonnes)	70
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits	40
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 3. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	Up to 70 Points

Group B - Qualification Electives		Weighting Points
<p>Complete units to at least 190 points from this group. You may select all your elective units from this Group.</p>		
UETTDRCJ22A	Install and maintain de-energised low voltage underground paper insulated cables.	40
UETTDRCJ23A	Install and maintain de-energised high voltage underground paper insulated cables.	60
UETTDRCJ24A	Joint and maintain energised low voltage underground paper insulated cables	60
UETTDRCJ25A	Perform straight through high voltage paper insulated to polymeric transition joint	50
UETTDRCJ28A	Joint and maintain energised low voltage underground polymeric cables	50
UETTD RDP11A	Inspect overhead poles/structures and electrical apparatus	50
UETTD RIS43A	Perform low voltage field switching operation to a given schedule.	50
UETTD RIS44A	Perform HV field switching operation to a given schedule	50
UETTD RIS53A	Install and maintain power system public lighting	40
UETTD RIS56A	Install and maintain low voltage overhead services	40
UETTD RIS57A	Conduct visual checking and treatment of power system poles and structures	30
UETTD RIS58A	Locate faults in power system underground power cables	60
UETTD RIS59A	Conduct high potential testing of power system underground power cables	50
UETTD RIS60A	Install and replace power system energy meters and associated equipment	50
UETTD RIS61A	Install mobile generation set for synchronised LV Genset	50
UETTD RSB39A	Perform power system substation switching operation to a given schedule	50

Note:

1. Prerequisite pathways shall be identified and met for all elective units selected.

2. In selecting elective units considerations to career planning advice should be given to units that form part of a prerequisite pathway for the progression to achieve particular competencies or qualification at a higher level.

END OF QUALIFICATION

Custom Content Section

Not applicable.

UET30912 Certificate III in ESI - Remote Community Utilities Worker

Modification History

Scope:

Those gaining this qualification will be able to acquire the skills and knowledge needed for a career in inspecting and maintaining essential public utilities (excludes mine sites) within Very Remote Communities.

All work on essential electrical utilities will be undertaken in a non-energised (Dead) environment other than for testing purposes.

The use of support plant and equipment to undertake these tasks and environmental concerns also play a part in this job function.

Definitions:

Very Remote Communities:

Means a community with restricted access and very little accessibility of goods, services and opportunities for social interaction. Very remote communities experience high levels of unemployment that leads to economic disadvantage. Supporting information on the classification of a very remote community can be defined using the latest version of ARIA (Accessibility/Remoteness Index of Australia)

Non-energised (Dead):

means prior to the commencement of work, all electrical apparatus is to be isolated. That is for High Voltage (short-circuited and earthed) and for Low Voltage (short-circuited to the neutral)

Release	Action	Core/Elective	Details	Points
2	Update	Group A	Update to release 2 NWP218B Perform and record sampling	20
2	Update	Group A	Update to Release 2 NWP261A Operate and maintain water treatment plant and equipment	30
2	Edit	Group A	Add UEENEEE131A Solve problems in ELV circuits for non electrical workers	40
2	Update	Core	Update name of unit UEENEEE102A Fabricate, assemble and dismantle utilities industry components	40

2	Add	Group A	UEENEEE131 Solve problems in ELV circuits for non electrical workers	40
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Description

Not applicable.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements:

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, defined in the Core Competency Standard Units table below and
- A combination of Elective competency standard units to achieve a total weighting of 360 points in accordance with the Elective Competency Standard Units table below.
- All the required prerequisite competency standard units have been met.

Core Units — All to be completed		Weighting Points
UEENEEE103A	Solve problems in ELV single path circuits	40
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	40
UEENEEE105A	Fix and secure electrotechnology equipment	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications	40
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work	20
UEENEEK101A	Maintain safety and tidiness of remote area power supply systems	20
UEENEEK102A	Work safely with remote area power supply systems	20
UEENEEK116A	Maintain and monitor remote area power generation facilities	80
UETTDREL11A	Apply sustainable energy and environmental procedures	20
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus	40
UETTDREL16A	Working safely near live electrical apparatus	20
UETTDRLS32A	Solve electrical problems in remote community network apparatus	80
UETTDRLS33A	Solve electrical problems in remote community network systems	80
UEENEEK120A	Maintain operation of remote area power	120

	generation plant	
UETTDNIS99A	Test and verify distribution remote area installations	40
Total points in core		700

Elective Competency Standard Units			
At least a weighting of 360 points to be achieved. Must achieve at least 180 points from Group B			
Group		Minimum points	Maximum points
A	Imported and Common Elective Units Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 3. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.	0	180
B	Qualification Electives You may select all your elective units from this Group	180	360

Group A – Imported and Common Elective Units		Weighting Points
You may complete units to a maximum weighting of 180 points		
CPCCLDG3001A	Licence to perform dogging	20
NWP218B	Perform and record sampling	20
NWP261A	Operate and maintain water treatment plant and equipment	30
AHCARB205A	Operate and maintain chainsaws	20
TLILIC0012A	License to operate a vehicle loading crane (Capacity 10 metre tonnes and above)	40
TLILIC2005A	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	40
UEENEEE131A	Solve problems in ELV circuits for non electrical workers	40
UEENEEK103A	Conduct periodic maintenance of remote area	40

	power supply battery banks	
UEENEEK104A	Conduct periodic maintenance of remote area power supply generator sets	40
UEENEEK105A	Conduct periodic maintenance of remote area power supply photo voltaic arrays	40
UEENEEK106A	Conduct periodic maintenance of remote area power supply wind generators	40
UEENEOP024A	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply	20
UEENEOP026A	Conduct in-service safety testing of electrical cord assemblies and cord connected appliances/equipment	20
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 3. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	Up to 180 Points

Group B At least 180 points to be achieved from this group.		Weighting Points
You may select all your elective units from this Group		
UETTDRCJ21A	Lay ESI electrical cables	20
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.	50
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.	50
UETTDROP11A	Inspect overhead poles/structures and electrical apparatus	50
UETTDRI36A	Install and maintain low voltage services in remote communities (overhead)	40
UETTDRI37A	Install and maintain low voltage services in remote communities (underground)	40
UETTDRI38A	Install and maintain public lighting systems in remote communities	40
UETTDRI52A	Install and maintain poles, structures and associated hardware	50
UETTDRI54A	Install and maintain overhead conductors and cables	60
UETTDRI34A	Install and replace energy meters and associated equipment in remote communities	50
UETTDRI35A	Perform remote community network field switching to a given schedule	40
UETTDRI55A	Install and maintain low voltage underground services	40

Note:

1. Prerequisite pathways shall be identified and met for all elective units selected.

END OF QUALIFICATION

Custom Content Section

Not applicable.

UET40412 Certificate IV in ESI — Network Systems

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	Core	Update name of unit UEENEEE102A Fabricate, assemble and dismantle utilities industry components	40

Description

Scope:

Those gaining this qualification will be able to acquire additional skills and knowledge needed for a career in one of four specific fields, namely, Live Line Transmission, Live Line Distribution, Live Line Rail Traction and or installation and maintenance of Specialised Underground Cables.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements:

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, defined in the Core Competency Standard Units table below and
- A combination of Elective competency standard units to achieve a total weighting of 740 points in accordance with the Elective Competency Standard Units table below.
- All the required prerequisite competency standard units have been met.

Core Units - All to be completed		Weighting Points
CPCCLDG3001A	Licence to perform dogging	20
TLILIC2005A	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	40
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	40
UEENEEE104A	Solve problems in d.c. circuits	80
UEENEEE105A	Fix and secure electrotechnology equipment	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications	40
UEENEEG101A	Solve problems in electromagnetic devices and related circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits	80
UETTDREL11A	Apply sustainable energy and environmental procedures	20
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus	40
UETTDREL16A	Working safely near live electrical apparatus	20
UETTDNIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs	30
UETTDNIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures	30

Total points in core	540
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Elective Competency Standard Units			
At least a weighting of 740 points to be achieved. Must achieve at least 320 points from Group C			
Group	Rules	Minimum points	Maximum points
A	<p>Imported and Common Elective Units</p> <p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 4. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p>	0	60
B	<p>Qualification Electives</p> <p>You may select units from this group to a maximum weighting of 420 points</p>	0	420
C	<p>Qualification Electives</p> <p>At least 320 points to be achieved from this group. You may select all your elective units from this Group.</p>	320	740

Group A – Imported Elective Units		Weighting Points
You may complete units to a maximum weighting of 60 points		
BSBINM401A	Implement workplace information system	40
BSBMGT402A	Implement operational plan	40
BSBMGT403A	Implement continuous improvement	40
BSBWOR401A	Implement effective workplace relationships	50
BSBWOR402A	Promote team effectiveness	50
CPCCLRG3001A	Licence to perform rigging basic level	40
AHCARB205A	Operate and maintain chainsaws	20
	Imported units from other training packages and/or	Up to 60

	<p>state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 4. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	<p>Points</p>
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Group B – Qualification Electives		Weighting Points
You may select units from this group to a maximum weighting of 420 points		
UETTDRCJ21A	Lay ESI electrical cables	20
UETTDRCJ22A	Install and maintain de-energised low voltage underground paper insulated cables.	40
UETTDRCJ23A	Install and maintain de-energised high voltage underground paper insulated cables.	60
UETTDRCJ24A	Joint and maintain energised low voltage underground paper insulated cables	60
UETTDRCJ25A	Perform straight through high voltage paper insulated to polymeric transition joint	50
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.	50
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.	50
UETTDRCJ28A	Joint and maintain energised low voltage underground polymeric cables	50
UETTDRCJ99A	Test and verify distribution cable jointing installations	40
UETTD RDP11A	Inspect overhead poles/structures and electrical apparatus	50
UETTD RDP12A	Maintain overhead energised low voltage conductors and cables	60
UETTD RDP99A	Test and verify distribution overhead installations	40
UETTD RIS41A	Install network infrastructure electrical equipment	60
UETTD RIS42A	Maintain network infrastructure electrical equipment	60
UETTD RIS44A	Perform HV field switching operation to a given schedule	50
UETTD RIS52A	Install and maintain poles, structures and associated hardware	50
UETTD RIS54A	Install and maintain overhead conductors and cables	60
UETTD RIS55A	Install and maintain low voltage underground services	40

UETTDNIS56A	Install and maintain low voltage overhead services	40
UETTDNIS57A	Conduct visual checking and treatment of power system poles and structures	30
UETTDNIS58A	Locate faults in power system underground power cables	60
UETTDNIS59A	Conduct high potential testing of power system underground power cables	50
UETTDNIS60A	Install and replace power system energy meters and associated equipment	50
UETTDNIS61A	Install mobile generation set for synchronised LV Genset	50
UETTDNRRT21A	Install traction overhead wiring systems	50
UETTDNRRT22A	Maintain traction overhead wiring systems	60
UETTDNRRT23A	Install rail traction bonds	40
UETTDNRRT24A	Maintain rail traction bonds	50
UETTDNRRT25A	Install overhead rail traction configurations	50
UETTDNRRT26A	Maintain overhead rail traction configurations	60
UETTDNRRT27A	Install overhead traction components and equipment	50
UETTDNRRT28A	Maintain overhead traction components and equipment	60
UETTDNRRT29A	Operate rail road traction height access equipment.	20
UETTDNRRT30A	Perform to a given schedule rail traction switching operations	50
UETTDNRRT99A	Test and verify rail traction installations	40
UETTDNRSB39A	Perform power system substation switching operation to a given schedule	50
UETTDNRTP26A	Erect power systems transmission structures and associated hardware	60
UETTDNRTP27A	Maintain power systems transmission structures and associated hardware	60
UETTDNRTP29A	Install and maintain overhead transmission conductors and cables	60
UETTDNRTP30A	Inspect overhead structures and electrical apparatus	40
UETTDNRTP99A	Test and verify transmission overhead installations	40
UETTDNRVC29A	Control vegetation whilst performing linework	40

Group C At least 320 points to be achieved from this group You may select all your elective units from this Group.		Weighting Points
UETTDRCJ29A	Install gas and oil filled specialised underground cables	60
UETTDRCJ30A	Maintain gas and oil filled specialised underground cables	60
UETTDRCJ31A	Install and maintain polymeric specialised underground cables	65
UETTDRCJ32A	Install and maintain gas and oil pressure systems for specialised underground cables	65
UETTDRDP13A	Maintain energised HV distribution overhead electrical apparatus (stick)	70
UETTDRDP14A	Maintain energised HV distribution overhead electrical apparatus (glove)	70
UETTDRDS31A	Draft and layout a power system overhead distribution extension	60
UETTDRDS32A	Draft and layout a power system underground distribution extension	60
UETTDRDS33A	Draft and layout a power system street lighting system	60
UETTDRDS34A	Draft and layout a power system distribution substation minor upgrade	60
UETTDRIS48A	Develop high voltage switching schedule	60
UETTDRIS49A	Develop low voltage switching schedule	90
UETTDRIS50A	Coordinate power system permit procedures	60
UETTDRIS51A	Coordinate and direct power system switching schedules	60
UETTDRIS64A	Install mobile generation set for synchronised HV Genset	40
UETTDRIS65A	Contribute to coordinated HV live line work	50
UETTDRRT31A	Maintain energised d.c. traction overhead wiring system	60
UETTDRRT32A	Maintain energised traction overhead electrical apparatus using stick techniques	70
UETTDRRT33A	Maintain energised traction overhead electrical apparatus using glove techniques	70

UETTD RTP31A	Maintain energised transmission lines using high voltage live work stick method	70
UETTD RTP32A	Maintain energised transmission lines using high voltage live work Barehand method	70
UETTD RTP33A	Maintain energised transmission lines using Barehand Technique on a helicopter platform	60
UETTD RVC30A	Coordinate vegetation control operations	60

Note:

1. Prerequisite pathways shall be identified and met for all elective units selected.

END OF QUALIFICATION

Custom Content Section

Not applicable.

UET40512 Certificate IV in ESI — Power Systems Substations

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	Core	Update name of unit UEENEEE102A Fabricate, assemble and dismantle utilities industry components	40

Description

Scope:

This qualification provides competencies to select, install, set up, test, fault find, repair and maintain electrical systems and equipment in building and premises. It includes ERAC requirements for an ‘Electrician’s licence’. It also provides a career in installation and maintenance of substations such as the maintenance of HV power system, including circuit breakers and transformers. It encompasses the carrying out of substation, switching, inspection, and the diagnosing and rectification of faults. Options are available for skills to be obtained in High Current d.c. switchgear and equipment, installation of HV plant and equipment and or the maintenance and commissioning of discrete protection and control systems.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements:

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, defined in the Core Competency Standard Units table below and
- A combination of Elective competency standard units to achieve a total weighting of 250 points in accordance with the Elective Competency Standard Units table below.
- All the required prerequisite competency standard units have been met.

Core Units — All to be completed		Weighting Points
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	40
UEENEEE104A	Solve problems in d.c. circuits	80
UEENEEE105A	Fix and secure electrotechnology equipment	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, cords and specifications	40
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work	20
UEENEEG006A	Solve problems in single and three phase low voltage machines	80
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits	60
UEENEEG063A	Arrange circuits, control and protection for general electrical installations	40
UEENEEG101A	Solve problems in electromagnetic devices and related circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits	80
UEENEEG103A	Install low voltage wiring and accessories	20
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations	20
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations	40
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits	40

UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations	60
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	40
UEENEEG109A	Develop and connect electrical control circuits	80
UEENEEK142A	Apply environmentally and sustainable procedures in the energy sector	20
UETTDREL16A	Working safely near live electrical apparatus	20
UETTDNIS62A	Implement and monitor the power systems organisational OHS policies, procedures and programs	30
UETTDNIS63A	Implement and monitor power systems environmental and sustainable energy management policies and procedures	30
UETTDNRSB22A	Carry out power systems substation inspection	60
UETTDNRSB23A	Install and maintain substation direct current systems	30
Total points in core		1030

Elective Competency Standard Units

At least a weighting of 250 points to be achieved. Must achieve at least 130 points from Group C

Group	Rules	Minimum points	Maximum points
A	Imported and Common Elective Units Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 4. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.	0	50
B	Qualification Electives You may select units from this group to a maximum weighting of 120 points	0	120
C	Qualification Electives	130	250

Elective Competency Standard Units			
At least a weighting of 250 points to be achieved. Must achieve at least 130 points from Group C			
Group	Rules	Minimum points	Maximum points
A	<p>Imported and Common Elective Units</p> <p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 4. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p>	0	50
B	<p>Qualification Electives</p> <p>You may select units from this group to a maximum weighting of 120 points</p>	0	120
	At least 130 points to be achieved from this group. You may select all your elective units from this Group.		

Group A Imported and Common Elective Units		Weighting Points
You may select units from this group to a maximum weighting of 50 points		
BSBWOR401A	Implement effective workplace relationships	50
BSBMGT402A	Implement operational plan	40
BSBINM401A	Implement workplace information system	40
BSBMGT403A	Implement continuous improvement	40
BSBWOR402A	Promote team effectiveness	50
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 4. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission,</p>	Up to 50 Points

	Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.	
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Group B You may select units from this group to a maximum weighting of 120 points		Weighting Points
UETTDNIS47A	Sample, test, filter and reinstate insulating oil	40
UETTDNIS67A	Solve problems in energy supply network equipment	80
UETTDNIS68A	Solve problems in energy supply network protection equipment and systems	40
UETTDNRSB29A	Maintain capacitor bank equipment for voltage regulation	40
UETTDNRSB33A	Install high voltage plant and equipment	50
UETTDNRSB39A	Perform power system substation switching operation to a given schedule	50

Group C At least 130 points to be achieved from this group. You may select all your elective units from this Group.		Weighting Points
UETTDNRSB21A	Diagnose and rectify faults in substation environment	40
UETTDNRSB24A	Maintain high voltage power system circuit breakers	60
UETTDNRSB25A	Maintain high voltage power and instrument transformers	80
UETTDNRSB26A	Install high current d.c. switchgear and equipment	40
UETTDNRSB27A	Maintain high current d.c. equipment and switchgear	40
UETTDNRSB30A	Maintain high voltage power system static VAR compensators (SVC)	30
UETTDNRSB31A	Maintain high voltage power system synchronous condensers	50
UETTDNRSB32A	Maintain power transformer on load tap changers (OLTC)	80
UETTDNRSB34A	Carry out surveys using thermovision techniques	30
UETTDNRSB35A	Maintain discrete control and protection systems	80
UETTDNRSB36A	Commission discrete control and protection systems	30
UETTDNRSB37A	Maintain power systems distribution field devices	80

Group C At least 130 points to be achieved from this group. You may select all your elective units from this Group.		Weighting Points
UETTDRSB38A	Commission power systems distribution field devices	30

Note:

1. Prerequisite pathways shall be identified and met for all elective units selected.

END OF QUALIFICATION

Custom Content Section

Not applicable.

UET40612 Certificate IV in ESI — Power Systems Network Infrastructure

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	Core	Update name of unit UEENEEE102A Fabricate, assemble and dismantle utilities industry components	40

Description

Scope:

This qualification provides competencies to select, install, set up, test, fault find, repair and maintain electrical systems and equipment in building and premises. It includes ERAC requirements for an 'Electrician's licence'. It's also provide acquire skills and knowledge needed for a career in installation and maintenance of network infrastructure, namely, Transmission, Distribution or Rail Traction in the Electricity Supply Industry.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements:

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, defined in the Core Competency Standard Units table below and
- A combination of Elective competency standard units to achieve a total weighting of 340 points in accordance with the Elective Competency Standard Units table below.
- All the required prerequisite competency standard units have been met.

Core Units — All to be completed		Weighting Points
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	40
UEENEEE104A	Solve problems in d.c. circuits	80
UEENEEE105A	Fix and secure electrotechnology equipment	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, cords and specifications	40
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work	20
UEENEEG006A	Solve problems in single and three phase low voltage machines	80
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits	60
UEENEEG063A	Arrange circuits, control and protection for general electrical installations	40
UEENEEG101A	Solve problems in electromagnetic devices and related circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits	80
UEENEEG103A	Install low voltage wiring and accessories	20
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations	20
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations	40
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits	40

UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations	60
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	40
UEENEEG109A	Develop and connect electrical control circuits	80
UEENEEK142A	Apply environmentally and sustainable procedures in the energy sector	20
UETTDREL16A	Working safely near live electrical apparatus	20
UETTDNIS62A	Implement and monitor the power systems organisational OHS policies, procedures and programs	30
UETTDNIS63A	Implement and monitor power systems environmental and sustainable energy management policies and procedures	30
Total points in core		940

Elective Competency Standard Units			
At least a weighting of 340 points to be achieved. Must achieve at least 200 points from Group C			
Group	Rules	Minimum points	Maximum points
A	<p>Imported and Common Elective Units</p> <p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 4. If units have not been assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p>	0	50
B	<p>Qualification Electives</p> <p>You may select units from this group to a maximum weighting of 140 points</p>	0	140
C	<p>Qualification Electives</p> <p>At least 200 points to be achieved from this group. You may select all your elective units from this Group.</p>	200	340

Group A Imported and Common Elective Units		Weighting Points
You may select units from this group to a maximum weighting of 50 points		
BSBWOR401A	Implement effective workplace relationships	50
BSBMGT402A	Implement operational plan	40
BSBINM401A	Implement workplace information system	40
BSBMGT403A	Implement continuous improvement	40
BSBWOR402A	Promote team effectiveness	50
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 4. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	Up to 50 Points

Group B You may select units from this group to a maximum weighting of 140 points		Weighting Points
UEENEEG171A	Install, set up and commission interval metering	20
UETTDRIS43A	Perform low voltage field switching operation to a given schedule.	50
UETTDRIS44A	Perform HV field switching operation to a given schedule	50
UETTDRIS47A	Sample, test, filter and reinstate insulating oil	40
UETTDRIS67A	Solve problems in energy supply network equipment	80
UETTDRIS68A	Solve problems in energy supply network protection equipment and systems	40
UETTDRSB39A	Perform power system substation switching operation to a given schedule	50

Group C At least 200 points to be achieved from this group. You may select all your elective units from this Group.		Weighting Points
UEENEEG076A	Install and replace low voltage current transformer metering	20
UETTDRCJ33A	Install and maintain network infrastructure LV underground cables	40
UETTDRCJ34A	Install and maintain network infrastructure HV underground cables	50
UETTDRDP15A	Inspect, maintain and restore energised low voltage overhead distribution network infrastructure	50
UETTDRIS45A	Install and maintain ESI overhead distribution network infrastructure	40
UETTDRIS46A	Install and maintain ESI network infrastructure electrical equipment	40
UETTDRIS48A	Develop high voltage switching schedule	40
UETTDRIS49A	Develop low voltage switching schedule	40
UETTDRIS50A	Coordinate power system permit procedures	40
UETTDRIS51A	Coordinate and direct power system switching schedules	40
UETTDRRT34A	Install and maintain traction network wiring	40

Group C At least 200 points to be achieved from this group. You may select all your elective units from this Group.		Weighting Points
	systems	
UETDRRT35A	Install and maintain traction network equipment and components	40
UETDRRT36A	Maintain traction network wiring systems	40
UETDRRT37A	Maintain traction network components and equipment	40
UETDRTP34A	Install/maintain overhead transmission network infrastructure	40
UETDRTP35A	Install/maintain transmission network infrastructure electrical equipment	40
UETDRTS37A	Perform current injection testing using phantom load	40
UETDRTS38A	Install and replace high voltage metering and associated equipment	40

Note:

1. Prerequisite pathways shall be identified and met for all elective units selected.

END OF QUALIFICATION

Custom Content Section

Not applicable.

UET50212 Diploma of ESI - Power Systems

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	Core	Update name of unit UEENEED104A Use engineering applications software on personal computers	40
2	Update	Core	Update name of unit UEENEEE102A Fabricate, assemble and dismantle utilities industry components	40

3	Add	Group C	UEENEEE190A Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications	60
3	Add	Group C	UEENEEE191A Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software	60
3	Add	Group C	UEENEEE192A Produce detailed electrotechnology /utilities drawings using computer aided design equipment and software	60
3	Add	Group D	UEENEEC005B Estimate electrotechnology projects	40
3	Add	Group D	UEENEEC006B Prepare tender submissions for electrotechnology projects	60
3	Add	Group D	UEENEER001B Contribute to the planning of a research project	120
3	Add	Group D	UEENEER002B Contribute to the conduct of a research project	120
3	Add	Group D	UEENEER003B Contribute to the development of a product/application/ service	120
3	Add	Group D	UEENEER004B Contribute to the trial of a product/Application/Service	120

3	Add	Group D	UEPOPS507B Conduct Project Management	60
3	Add	Group D	UEPOPS520A Evaluate cost estimations and initiate appropriate solutions	40

Description

Scope:

Those gaining this qualification will be able to acquire skills and knowledge needed for a career in either, design, protection/testing and or system operation.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements:

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, defined in the Core Competency Standard Units table below and
- A combination of Elective competency standard units to achieve a total weighting of 900 points in accordance with the Elective Competency Standard Units table below.
- All the required prerequisite competency standard units have been met.

Core Units - All to be completed		Weighting Points
UEENEED104A	Use engineering applications software on personal computers	40
UEENEEE124A	Compile and produce an energy sector detailed report	60
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	40
UEENEEE104A	Solve problems in d.c. circuits	80
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications	40
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems	60
UEENEEE126A	Provide solutions to basic engineering computational problems	60
UEENEED101A	Solve problems in electromagnetic devices and related circuits	60
UEENEED102A	Solve problems in low voltage a.c. circuits	80
UEENEED149A	Provide engineering solutions to problems in complex polyphase power circuits	60
UETTDREL11A	Apply sustainable energy and environmental procedures	20
UETTDREL16A	Working safely near live electrical apparatus	20
UETTDRLS62A	Implement and monitor the power systems organisational OHS policies, procedures and programs	30

UETTDRI63A	Implement and monitor power systems environmental and sustainable energy management policies and procedures	30
Total points in core		700

Elective Competency Standard Units

At least a weighting of 900 points to be achieved. Must achieve at least 140 points from Group D

Group	Rules	Minimum points	Maximum points
A	<p>Imported and Common Elective Units</p> <p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 5. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p>	0	270
B	<p>Qualification Electives</p> <p>You may select units from this group to a maximum weighting of 400 points.</p>	0	400
C	<p>Qualification Electives</p> <p>You may select units from this group to a maximum weighting of 200 points.</p>	0	200
D	<p>Qualification Electives</p> <p>At least 140 points to be achieved from this group. You may select all your elective units from this Group</p>	140	900

Group A You may select units from this group to a maximum weighting of 270 points.		Weighting Points
BSBWOR501B	Manage personal work priorities and professional development	60
BSBMGT502B	Manage people performance	70
BSBMGT515A	Manage operational plan	60

BSBINM501A	Manage an information or knowledge management system	50
BSBCUS501C	Manage quality customer service	40
BSBMGT516C	Facilitate continuous improvement	60
BSBINN502A	Build and sustain an innovative work environment	50
BSBLED501A	Develop a workplace learning environment	60
BSBWOR502B	Ensure team effectiveness	60
BSBFIM501A	Manage budgets and financial plans	70
BSBSUS501A	Develop workplace policy and procedures for sustainability	50
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 5. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	Up to 270 Points

Group B You may select units from this group to a maximum weighting of 400 points.		Weighting Points
UEENEEG006A	Solve problems in single and three phase low voltage machines	80
UEENEEH102A	Repair basic electronic apparatus faults by replacement of components	40
UEENEEH112A	Troubleshoot digital sub-systems	80
UEENEEH139A	Troubleshoot basic amplifier circuits	40
UETTDREL15A	Respond to power systems technical enquiries and requests	40
UETTDNIS67A	Solve problems in energy supply network equipment	80
UETTDNIS68A	Solve problems in energy supply network protection equipment and systems	40

Group C You may select units from this group to a maximum weighting of 200 points.		Weighting Points
UEENEEE190A	Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications	60
UEENEEE191A	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software	60
UEENEEE192A	Produce detailed electrotechnology /utilities drawings using computer aided design equipment and software	60
UEENEEI155A	Develop structured programs to control external devices	40
UETTDNRD31A	Draft and layout an power system overhead distribution extension	60
UETTDNRD32A	Draft and layout an power system underground distribution extension	60
UETTDNRD33A	Draft and layout a power system street lighting system	60
UETTDNRD34A	Draft and layout a power system distribution substation minor upgrade	60

Group D At least 140 points to be achieved from this group. You may select all your elective units from this Group.		Weighting Points
UEENEEC005B	Estimate electrotechnology projects	40
UEENEEC006B	Prepare tender submissions for electrotechnology projects	60
UEENEER001B	Contribute to the planning of a research project	120
UEENEER002B	Contribute to the conduct of a research project	120
UEENEER003B	Contribute to the development of a product/application/ service	120
UEENEER004B	Contribute to the trial of a product/Application/Service	120
UEPOPS507B	Conduct Project Management	
UEPOPS520A	Evaluate cost estimations and initiate appropriate solutions	
UETTDRDS35A	Design overhead distribution power systems	140
UETTDRDS36A	Design underground distribution power systems	140
UETTDRDS37A	Design power system distribution substations	140
UETTDRDS38A	Design power system public lighting systems	140
UETTDRDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure	140
UETTDRDS42A	Investigate quality of power systems supply issues	140
UETTDRDS43A	Develop high voltage and low voltage distribution protection systems	150
UETTDRDS44A	Design power system zone substations modifications	150
UETTDRDS45A	Organise and implement ESI line and easement surveys	140
UETTDRDS46A	Develop planned power systems outage strategies	140
UETTDRDS49A	Establish and manage power system geographical information systems data	140
UETTDRIS66A	Manage an electricity power system OHS management system	140
UETTDRIS69A	Diagnose and rectify faults in energy supply apparatus	60
UETTDRIS71A	Diagnose and rectify faults in electrical energy supply transmission systems	60

Group D At least 140 points to be achieved from this group. You may select all your elective units from this Group.		Weighting Points
UETTDNIS72A	Diagnose and rectify faults in distributed Generation systems	60
UETTDNIS036A	Develop low voltage distribution switching programs	150
UETTDNIS037A	Develop high voltage distribution and subtransmission switching programs	150
UETTDNIS038A	Develop and evaluate power systems transmission switching programs	150
UETTDNIS039A	Coordinate low voltage distribution networks	150
UETTDNIS040A	Coordinate high voltage distribution and subtransmission networks	150
UETTDNIS043A	Coordinate low voltage distribution network demand	150
UETTDNIS045A	Operate and monitor system SCADA equipment	150
UETTDNIS046A	Monitor and control the field staff activities	150
UETTDNIS047A	Coordinate high voltage transmission network	150
UETTDNIS048A	Respond to discrete and interdependent protection operations	150
UETTDNIS049A	Coordinate power system operations in a regulated energy market	150
UETTDNIS21A	Maintain interdependent network protection and control systems	150
UETTDNIS22A	Commission interdependent network protection and control systems	150
UETTDNIS25A	Maintain and test and metering schemes	140
UETTDNIS26A	Commission power systems metering schemes	150
UETTDNIS27A	Perform accuracy checks on power systems instrument transformers	150
UETTDNIS28A	Repair, test and calibrate protection relays and meters	150
UETTDNIS29A	Develop power systems secondary isolation instructional documents	150
UETTDNIS31A	Maintain, test and commission power systems voltage regulating equipment	150
UETTDNIS34A	Install and maintain power system communication	150

Group D At least 140 points to be achieved from this group. You may select all your elective units from this Group.		Weighting Points
	equipment	
UETTDRTS35A	Maintain complex network protection and control systems	180

Note:

1. Prerequisite pathways shall be identified and met for all elective units selected.

END OF QUALIFICATION

Custom Content Section

Not applicable.

UET50312 Diploma of ESI - Power Systems Operations

Modification History

Release	Action	Core/Elective	Details	Points
2	Add	Group A	TLIF2010A Apply fatigue management strategies	30
2	Add	Group A	TLIF3063A Administer the implementation of fatigue management strategies	50

Description

Scope

Those gaining this qualification will be able to acquire skills and knowledge needed for a career in system operation.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements:

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, defined in the Core Competency Standard Units table below and
- A combination of Elective competency standard units to achieve a total weighting of 750 points in accordance with the Elective Competency Standard Units table below.
- All the required prerequisite competency standard units have been met.

Core Competency Standard Units		Weighting Points
All Core competency standard units to be achieved		
UEENEED104A	Use software for engineering applications	40
UEENEEE124A	Compile and produce an energy sector detailed report	60
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UETTDREL15A	Respond to power systems technical enquiries and requests	40
UEENEEE104A	Solve problems in d.c. circuits	80
UEENEEE107A	Use drawings, diagrams, schedules, standards, cords and specifications	40
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems	60
UEENEEE126A	Provide solutions to basic engineering computational problems	60
UEENEED101A	Solve problems in electromagnetic devices and related circuits	60
UEENEED102A	Solve problems in low voltage a.c. circuits	80
UEENEED149A	Provide engineering solutions to problems in complex polyphase power circuits	60
UETTDREL11	Apply sustainable energy and environmental	20

Core Competency Standard Units		Weighting Points
All Core competency standard units to be achieved		
A	procedures	
UETTDREL16 A	Working safely near live electrical apparatus	20
UETTDRLS62A	Implement and monitor the power systems organisational OHS policies, procedures and programs	30
UETTDRLS63A	Implement and monitor power systems environmental and sustainable energy management policies and procedures	30
UETTDRLS045 A	Operate and monitor system SCADA equipment	150
Total points in core		850

Elective Competency Standard Units			
At least a weighting of 750 points to be achieved. Must achieve at least 190 points from Group D			
Group	Rules	Minimum points	Maximum points
A	<p>Imported and Common Elective Units</p> <p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 5. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p>	0	270
B	<p>Qualification Electives</p> <p>You may select units from this group to a maximum weighting of 360 points.</p>	0	360
C	<p>Qualification Electives</p> <p>You may select units from this group to a maximum weighting of 200 points.</p>	0	200
D	<p>Qualification Electives</p>	190	750

Elective Competency Standard Units			
At least a weighting of 750 points to be achieved. Must achieve at least 190 points from Group D			
Group	Rules	Minimum points	Maximum points
A	<p>Imported and Common Elective Units</p> <p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 5. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p>	0	270
B	<p>Qualification Electives</p> <p>You may select units from this group to a maximum weighting of 360 points.</p>	0	360
	At least 190 points to be achieved from this group. You may select all your elective units from this Group		

Group A – Imported and Common Elective Units		Weighting Points
You may select units from this group to a maximum weighting of 270 points.		
BSBWOR501B	Manage personal work priorities and professional development	60
BSBMGT502B	Manage people performance	70
BSBMGT515A	Manage operational plan	60
BSBINM501A	Manage an information or knowledge management system	50
BSBCUS501C	Manage quality customer service	40
BSBMGT516C	Facilitate continuous improvement	60
BSBINN502A	Build and sustain an innovative work environment	50
BSBLED501A	Develop a workplace learning environment	60

BSBWOR502B	Ensure team effectiveness	60
BSBFIM501A	Manage budgets and financial plans	70
BSBSUS501A	Develop workplace policy and procedures for sustainability	50
TLIF2010A	Apply Fatigue Management Strategies	30
TLIF3063A	Administer the implementation of fatigue management strategies	50
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 5. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	Up to 270 Points

Group B – Qualification Elective Units		Weighting Points
You may select units from this group to a maximum weighting of 360 points.		
UEENEEG006A	Solve problems in single and three phase low voltage machines	80
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	40
UEENEEH102A	Repair basic electronic apparatus faults by replacement of components	40
UEENEEH112A	Troubleshoot digital sub-systems	80
UEENEEH139A	Troubleshoot basic amplifier circuits	40
UETTDRIS67A	Solve problems in energy supply network equipment	80
UETTDRIS68A	Solve problems in energy supply network protection equipment and systems	40

Group C – Qualification Elective Units		Weighting Points
You may select units from this group to a maximum weighting of 200 points.		
UEENEEI155A	Develop structured programs to control external devices	40
UETTDRDS31A	Draft and layout an power system overhead distribution extension	60
UETTDRDS32A	Draft and layout an power system underground distribution extension	60
UETTDRDS33A	Draft and layout a power system street lighting system	60
UETTDRDS34A	Draft and layout a power system distribution substation minor upgrade	60

Group D – Qualification Elective Units		Weighting Points
At least 140 points to be achieved from this group.		

You may select all your elective units from this Group.		
UETTDRDS35A	Design overhead distribution power systems	140
UETTDRDS36A	Design underground distribution power systems	140
UETTDRDS37A	Design power system distribution substations	140
UETTDRDS38A	Design power system public lighting systems	140
UETTDRDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure	140
UETTDRDS42A	Investigate quality of power systems supply issues	140
UETTDRDS43A	Develop high voltage and low voltage distribution protection systems	150
UETTDRDS44A	Design power system zone substations modifications	150
UETTDRDS45A	Organise and implement ESI line and easement surveys	140
UETTDRDS46A	Develop planned power systems outage strategies	140
UETTDRDS49A	Establish and manage power system geographical information systems data	140
UETTDRIS66A	Manage an electricity power system OHS management system	140
UETTDRIS69A	Diagnose and rectify faults in energy supply apparatus	60
UETTDRIS70A	Diagnose and rectify faults in electrical energy distribution systems	60
UETTDRIS71A	Diagnose and rectify faults in electrical energy supply transmission systems	60
UETTDRIS72A	Diagnose and rectify faults in distributed Generation systems	60
UETTDRSO36A	Develop low voltage distribution switching programs	150
UETTDRSO37A	Develop high voltage distribution and	150

	subtransmission switching programs	
UETTDRSO38A	Develop and evaluate power systems transmission switching programs	150
UETTDRSO39A	Coordinate low voltage distribution networks	150
UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks	150
UETTDRSO43A	Coordinate low voltage distribution network demand	150
UETTDRSO46A	Monitor and control the field staff activities	150
UETTDRSO47A	Coordinate high voltage transmission network	150
UETTDRSO48A	Respond to discrete and interdependent protection operations	150
UETTDRSO49A	Coordinate power system operations in a regulated energy market	150
UETTDRTS21A	Maintain interdependent network protection and control systems	150
UETTDRTS22A	Commission interdependent network protection and control systems	150
UETTDRTS25A	Maintain and test and metering schemes	140
UETTDRTS26A	Commission power systems metering schemes	150
UETTDRTS27A	Perform accuracy checks on power systems instrument transformers	150
UETTDRTS28A	Repair, test and calibrate protection relays and meters	150
UETTDRTS29A	Develop power systems secondary isolation instructional documents	150
UETTDRTS31A	Maintain, test and commission power systems voltage regulating equipment	150
UETTDRTS34A	Install and maintain power system communication equipment	150
UETTDRTS35A	Maintain complex network protection and control	180

	systems	
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Note:

1. Prerequisite pathways shall be identified and met for all elective units selected.

END OF QUALIFICATION

Custom Content Section

Not applicable.

UET60212 Advanced Diploma of ESI — Power Systems

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	Core	Update name of unit UEENEED104A Use engineering applications software on personal computers	40
2	Update	Group C	Update name of unit UEENEED117A Install and configure network systems for internetworking	120
2	Update	Core	Update name of unit UEENEEE102A Fabricate, assemble and dismantle utilities industry components	40
2	Add	Group E	UETTDRTS23A Conduct evaluation of power system substation faults	140
2	Add	Group E	UETTDRTS24A Design testing and commissioning procedures for field devices and substations	140
2	Add	Group E	UETTDRTS30A Design power systems secondary isolation instructional documents	160
2	Add	Group E	UETTDRTS32A Conduct evaluation of power systems primary plant	160
2	Add	Group E	UETTDRTS33A Undertake power systems project management of substation augmentation and maintenance	180
2	Add	Group E	UETTDRTS35A Maintain complex network protection and control systems	180
2	Add	Group E	UETTDRTS36A Commission complex network protection and control systems	180

Description

Scope:

Those gaining this qualification will be able to acquire additional skills and knowledge needed for a career in either, design, testing and or system operation.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements:

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, defined in the Core Competency Standard Units table below and
- A combination of Elective competency standard units to achieve a total weighting of 1340 points in accordance with the Elective Competency Standard Units table below.
- All the required prerequisite competency standard units have been met.

Core Units — All to be completed		Weighting Points
UEENEED104A	Use engineering applications software on personal computers	40
UEENEEE124A	Compile and produce an energy sector detailed report	60
UEENEEE083A	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components	40
UEENEEE104A	Solve problems in d.c. circuits	80
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications	40
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems	60
UEENEEE126A	Provide solutions to basic engineering computational problems	60
UEENEEG101A	Solve problems in electromagnetic devices and related circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits	80
UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits	60
UETTDREL11A	Apply sustainable energy and environmental procedures	20
UETTDREL16A	Working safely near live electrical apparatus	20
UETTDRLS62A	Implement and monitor the power systems	30

	organisational OHS policies, procedures and programs	
UETTD63A	Implement and monitor power systems environmental and sustainable energy management policies and procedures	30
Total points in core		820

Elective Competency Standard Units

At least a weighting of 1340 points to be achieved. Must achieve at least 140 points from Group D and 440 points from Group E.

Group	Rules	Minimum points	Maximum points
A	<p>Imported and Common Elective Units</p> <p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 6. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p>	0	360
B	<p>Qualification Electives</p> <p>You may select units from this group to a maximum weighting of 400 points.</p>	0	400
C	<p>Qualification Electives</p> <p>You may select units from this group to a maximum weighting of 200 points.</p>	0	200
D	<p>Qualification Electives</p> <p>You must select units from this group with a minimum weighting of 140 points and a maximum weighting of 900 points.</p>	140	900
E	<p>Qualification Electives</p> <p>You must select units from this group with a minimum weighting of 440 points and a maximum weighting of 1200 points.</p>	440	1200

Group A You may select units from this group to a maximum weighting of 360 points.		Weighting Points
BSBWOR501B	Manage personal work priorities and professional development	60
BSBMGT502B	Manage people performance	70
BSBMGT515A	Manage operational plan	60
BSBINM501A	Manage an information or knowledge management system	50
BSBCUS501C	Manage quality customer service	40
BSBMGT516C	Facilitate continuous improvement	60
BSBINN502A	Build and sustain an innovative work environment	50
BSBLED501A	Develop a workplace learning environment	60
BSBWOR502B	Ensure team effectiveness	60
BSBFIM501A	Manage budgets and financial plans	70
BSBSUS501A	Develop workplace policy and procedures for sustainability	50
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 6. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	Up to 360 Points

Group B You may select units from this group to a maximum weighting of 400 points.		Weighting Points
UEENEEG006A	Solve problems in single and three phase low voltage machines	80
UEENEEH102A	Repair basic electronic apparatus faults by replacement of components	40
UEENEEH112A	Troubleshoot digital sub-systems	80
UEENEEH139A	Troubleshoot basic amplifier circuits	40
UETTDREL15A	Respond to power systems technical enquiries and requests	40
UETTDNIS67A	Solve problems in energy supply network equipment	80
UETTDNIS68A	Solve problems in energy supply network protection equipment and systems	40

Group C You may select units from this group to a maximum weighting of 200 points.		Weighting Points
UEENEEI117A	Install and configure network systems for internetworking	120
UEENEEI155A	Develop structured programs to control external devices	40
UETTDNDS31A	Draft and layout a power system overhead distribution extension	60
UETTDNDS32A	Draft and layout a power system underground distribution extension	60
UETTDNDS33A	Draft and layout a power system street lighting system	60
UETTDNDS34A	Draft and layout a power system distribution substation minor upgrade	60

Group D You must select units from this group with a minimum weighting of 140 points and a maximum weighting of 900 points.		Weighting Points
UEENEEI156A	Develop and test code for microcontroller devices	60
UETTDNDS35A	Design overhead distribution power systems	140
UETTDNDS36A	Design underground distribution power systems	140

UETTDNRDS37A	Design power system distribution substations	140
UETTDNRDS38A	Design power system public lighting systems	140
UETTDNRDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure	140
UETTDNRDS42A	Investigate quality of power systems supply issues	140
UETTDNRDS43A	Develop high voltage and low voltage distribution protection systems	150
UETTDNRDS44A	Design power system zone substations modifications	150
UETTDNRDS45A	Organise and implement ESI line and easement surveys	140
UETTDNRDS46A	Develop planned power systems outage strategies	140
UETTDNRDS49A	Establish and manage power system geographical information systems data	140
UETTDNRIS66A	Manage an electricity power system OHS management system	140
UETTDNRIS69A	Diagnose and rectify faults in energy supply apparatus	60
UETTDNRIS70A	Diagnose and rectify faults in electrical energy distribution systems	60
UETTDNRIS72A	Diagnose and rectify faults in distributed Generation systems	60
UETTDNRSO36A	Develop low voltage distribution switching programs	150
UETTDNRSO37A	Develop high voltage distribution and subtransmission switching programs	150
UETTDNRSO38A	Develop and evaluate power systems transmission switching programs	150
UETTDNRSO39A	Coordinate low voltage distribution networks	150
UETTDNRSO40A	Coordinate high voltage distribution and subtransmission networks	150
UETTDNRSO43A	Coordinate low voltage distribution network demand	150
UETTDNRSO45A	Operate and monitor system SCADA equipment	150
UETTDNRSO46A	Monitor and control the field staff activities	150
UETTDNRSO47A	Coordinate high voltage transmission network	150
UETTDNRSO48A	Respond to discrete and interdependent protection	150

	operations	
UETTDORSO49A	Coordinate power system operations in a regulated energy market	150
UETTDRTS21A	Maintain interdependent network protection and control systems	150
UETTDRTS22A	Commission interdependent network protection and control systems	150
UETTDRTS25A	Maintain and test and metering schemes	140
UETTDRTS26A	Commission power systems metering schemes	150
UETTDRTS27A	Perform accuracy checks on power systems instrument transformers	150
UETTDRTS28A	Repair, test and calibrate protection relays and meters	150
UETTDRTS29A	Develop power systems secondary isolation instructional documents	150
UETTDRTS31A	Maintain, test and commission power systems voltage regulating equipment	150
UETTDRTS34A	Install and maintain power system communication equipment	150

Group E You must select units from this group with a minimum weighting of 440 points and a maximum weighting of 1200 points.		Weighting Points
UETTDORS40A	Prepare and appraise power systems financial impact statements	160
UETTDORS41A	Manage electrical power systems infrastructure projects	160
UETTDORS47A	Review power system asset management strategies	150
UETTDORS48A	Analyse and appraise power system fault and outage data	150
UETTDORS50A	Design customer power system substations	140
UETTDORS51A	Manage power system transmission and sub-transmission design process	150
UETTDORS52A	Design power system transmission, sub-transmission and zone substation buildings	160
UETTDORS53A	Design power system transmission and sub-transmission substation primary plant	180
UETTDORS54A	Design power system transmission and	180

	sub-transmission protection and control	
UETTD RDS55A	Design power system transmission and sub-transmission substation earthing	160
UETTD RDS56A	Design power system transmission, sub-transmission and zone substation – civil and structural components	160
UETTD RDS57A	Design power system overhead transmission systems	160
UETTD RDS58A	Design underground transmission systems	160
UETTD RIS71A	Develop engineering solutions for energy supply power transformer problems	60
UETTD RIS73A	Develop engineering solutions for energy supply power transformer problems	60
UETTD RSO32A	Manage power systems network faults	180
UETTD RSO33A	Manage power systems critical events	180
UETTD RSO34A	Control power systems generating plant	140
UETTD RSO35A	Manage high voltage distribution and subtransmission network demand	180
UETTD RSO41A	Manage power systems transmission networks	180
UETTD RSO42A	Manage power systems transmission network demand	180
UETTD RSO44A	Develop crisis power systems management plans	140
UETTD RSO50A	Respond to complex power system protection operations	180
UETTD RSO51A	Manage network systems power flows	180
UETTD RTS23A	Conduct evaluation of power system substation faults	140
UETTD RTS24A	Design testing and commissioning procedures for field devices and substations	140
UETTD RTS30A	Design power systems secondary isolation instructional documents	160
UETTD RTS32A	Conduct evaluation of power systems primary plant	160
UETTD RTS33A	Undertake power systems project management of	180

	substation augmentation and maintenance	
UETTDRTS35A	Maintain complex network protection and control systems	180
UETTDRTS36A	Commission complex network protection and control systems	180

END OF QUALIFICATION**Custom Content Section**

Not applicable.

UET60312 Advanced Diploma of ESI - Power Systems Operations

Modification History

Release	Action	Core/Elective	Details	Points
2	Add	Group A	TLIF2010A Apply fatigue management strategies	30
2	Add	Group A	TLIF3063A Administer the implementation of fatigue management strategies	50

Description

Scope:

Those gaining this qualification will be able to acquire additional skills and knowledge needed for a career in system operation.

Pathways Information

Not applicable.

Licensing/Regulatory Information

Not applicable.

Entry Requirements

Not applicable.

Employability Skills Summary

Not applicable.

Packaging Rules

Completion requirements

The requirements for granting this qualification will be met when competency is demonstrated and achieved for:

- All the Core competency standard units, defined in the Core Competency Standard Units table below and
- A combination of Elective competency standard units to achieve a total weighting of 1090 points in accordance with the Elective Competency Standard Units table below.
- All the required prerequisite competency standard units have been met.

Core Competency Standard Units		Weighting Points
All Core competency standard units to be achieved		
UEENEED104 A	Use software for engineering applications	40
UEENEEE124A	Compile and produce an energy sector detailed report	60
UEENEEE083A	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace	20
UETTDREL15 A	Respond to power systems technical enquiries and requests	40
UEENEEE104A	Solve problems in d.c. circuits	80
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications	40
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems	60
UEENEEE126A	Provide solutions to basic engineering computational problems	60
UEENEED101 A	Solve problems in electromagnetic devices and related circuits	60
UEENEED102 A	Solve problems in low voltage a.c. circuits	80
UEENEED149	Provide engineering solutions to problems in complex	60

Core Competency Standard Units		Weighting Points
All Core competency standard units to be achieved		
A	polyphase power circuits	
UETTDREL11 A	Apply sustainable energy and environmental procedures	20
UETTDREL16 A	Working safely near live electrical apparatus	20
UETTDRLS62A	Implement and monitor the power systems organisational OHS policies, procedures and programs	30
UETTDRLS63A	Implement and monitor power systems environmental and sustainable energy management policies and procedures	30
UETTDRLS045 A	Operate and monitor system SCADA equipment	150
Total points in core		970

Elective Competency Standard Units			
At least a weighting of 1090 points to be achieved. Must achieve at least 140 points from Group D and 440 points from Group E.			
Group	Rules	Minimum points	Maximum points
A	<p>Imported and Common Elective Units</p> <p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 6. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p>	0	360
B	<p>Qualification Electives</p> <p>You may select units from this group to a maximum weighting of 360 points.</p>	0	360

C	Qualification Electives You may select units from this group to a maximum weighting of 200 points.	0	200
D	Qualification Electives You must select units from this group with a minimum weighting of 140 points and a maximum weighting of 900 points.	140	650
E	Qualification Electives You must select units from this group with a minimum weighting of 440 points and a maximum weighting of 1090 points.	440	950

Group A – Imported and Common Elective Units		Weighting Points
You may select units from this group to a maximum weighting of 360 points.		
BSBWOR501B	Manage personal work priorities and professional development	60
BSBMGT502B	Manage people performance	70
BSBMGT515A	Manage operational plan	60
BSBINM501A	Manage an information or knowledge management system	50
BSBCUS501C	Manage quality customer service	40
BSBMGT516C	Facilitate continuous improvement	60
BSBINN502A	Build and sustain an innovative work environment	50
BSBLED501A	Develop a workplace learning environment	60
BSBWOR502B	Ensure team effectiveness	60
BSBFIM501A	Manage budgets and financial plans	70
BSBSUS501A	Develop workplace policy and procedures for sustainability	50
TLIF2010A	Apply fatigue management strategies	30

TLIF3063A	Administer the implementation of fatigue management strategies	50
	<p>Imported units from other training packages and/or state accredited courses can be added to this group, but they must be selected from qualifications where the unit is first packaged at AQF level 6. If units have not being assigned a weighting by the relevant EE-Oz Industry Technical Advisory Committee, their weighting will be 10 points.</p> <p>Note: For further information see Application of the NQC Flexibility Formula, Page 10, UET12 Electricity Supply Industry – Transmission, Distribution and Rail Sector Training Package, Version 1, Volume 1 Qualification Framework.</p>	Up to 360 Points

Group B – Qualification Elective Units		Weighting Points
You may select units from this group to a maximum weighting of 360 points.		
UEENEEG006A	Solve problems in single and three phase low voltage machines	80
UEENEEH102A	Repair basic electronic apparatus faults by replacement of components	40
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components	40
UEENEEH112A	Troubleshoot digital sub-systems	80
UEENEEH139A	Troubleshoot basic amplifier circuits	40
UETTDRIS67A	Solve problems in energy supply network equipment	80
UETTDRIS68A	Solve problems in energy supply network protection equipment and systems	40

Group C – Qualification Elective Units		Weighting Points
You may select units from this group to a maximum weighting of 200		

points.		
UEENEED117A	Install and configure internetworking systems	120
UEENEEI155A	Develop structured programs to control external devices	40
UETTDRDS31A	Draft and layout an power system overhead distribution extension	60
UETTDRDS32A	Draft and layout an power system underground distribution extension	60
UETTDRDS33A	Draft and layout a power system street lighting system	60
UETTDRDS34A	Draft and layout a power system distribution substation minor upgrade	60

Group D – Qualification Elective Units		Weighting Points
You must select units from this group with a minimum weighting of 140 points and a maximum weighting of 650 points.		
UEENEEI156A	Develop and test code for microcontroller devices	60
UETTDRDS35A	Design overhead distribution power systems	140
UETTDRDS36A	Design underground distribution power systems	140
UETTDRDS37A	Design power system distribution substations	140
UETTDRDS38A	Design power system public lighting systems	140
UETTDRDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure	140
UETTDRDS42A	Investigate quality of power systems supply issues	140
UETTDRDS43A	Develop high voltage and low voltage distribution protection systems	150
UETTDRDS44A	Design power system zone substations modifications	150
UETTDRDS45A	Organise and implement ESI line and easement surveys	140

UETTD RDS46A	Develop planned power systems outage strategies	140
UETTD RDS49A	Establish and manage power system geographical information systems data	140
UETTD RIS66A	Manage an electricity power system OHS management system	140
UETTD RIS69A	Diagnose and rectify faults in energy supply apparatus	60
UETTD RIS70A	Diagnose and rectify faults in electrical energy distribution systems	60
UETTD RIS71A	Diagnose and rectify faults in electrical energy supply transmission systems	60
UETTD RIS72A	Diagnose and rectify faults in distributed Generation systems	60
UETTD RSO36A	Develop low voltage distribution switching programs	150
UETTD RSO37A	Develop high voltage distribution and subtransmission switching programs	150
UETTD RSO38A	Develop and evaluate power systems transmission switching programs	150
UETTD RSO39A	Coordinate low voltage distribution networks	150
UETTD RSO40A	Coordinate high voltage distribution and subtransmission networks	150
UETTD RSO43A	Coordinate low voltage distribution network demand	150
UETTD RSO46A	Monitor and control the field staff activities	150
UETTD RSO47A	Coordinate high voltage transmission network	150
UETTD RSO48A	Respond to discrete and interdependent protection operations	150
UETTD RSO49A	Coordinate power system operations in a regulated energy market	150
UETTD RTS21A	Maintain interdependent network protection and control systems	150

UETTDRTS22A	Commission interdependent network protection and control systems	150
UETTDRTS25A	Maintain and test and metering schemes	140
UETTDRTS26A	Commission power systems metering schemes	150
UETTDRTS27A	Perform accuracy checks on power systems instrument transformers	150
UETTDRTS28A	Repair, test and calibrate protection relays and meters	150
UETTDRTS29A	Develop power systems secondary isolation instructional documents	150
UETTDRTS31A	Maintain, test and commission power systems voltage regulating equipment	150
UETTDRTS34A	Install and maintain power system communication equipment	150

Group E – Qualification Elective Units		Weighting Points
You must select units from this group with a minimum weighting of 440 points and a maximum weighting of 950 points.		
UETTDRDS40A	Prepare and appraise power systems financial impact statements	160
UETTDRDS41A	Manage electrical power systems infrastructure projects	160
UETTDRDS47A	Review power system asset management strategies	150
UETTDRDS48A	Analyse and appraise power system fault and outage data	150
UETTDRDS50A	Design customer power system substations	140
UETTDRDS51A	Manage power system transmission and sub-transmission design process	150
UETTDRDS52A	Design power system transmission, sub-transmission and zone substation buildings	160
UETTDRDS53A	Design power system transmission and	180

	sub-transmission substation primary plant	
UETTDRDS54A	Design power system transmission and sub-transmission protection and control	180
UETTDRDS55A	Design power system transmission and sub-transmission substation earthing	160
UETTDRDS56A	Design power system transmission, sub-transmission and zone substation – civil and structural components	160
UETTDRDS57A	Design power system overhead transmission systems	160
UETTDRDS58A	Design underground transmission systems	160
UETTDRIS73A	Develop engineering solutions for energy supply power transformer problems	60
UETTDRSO32A	Manage power systems network faults	180
UETTDRSO33A	Manage power systems critical events	180
UETTDRSO34A	Control power systems generating plant	180
UETTDRSO35A	Manage high voltage distribution and subtransmission network demand	180
UETTDRSO41A	Manage power systems transmission networks	180
UETTDRSO42A	Manage power systems transmission network demand	180
UETTDRSO44A	Develop crisis power systems management plans	140
UETTDRSO50A	Respond to complex power system protection operations	180
UETTDRSO51A	Manage network systems power flows	180

END OF QUALIFICATION

Custom Content Section

Not applicable.

UETSS00018 Refresher - Apply Access Procedures to Work On or Near Electrical Network Infrastructure

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency.

ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

UETDTRRF09B Apply access procedures to work on or near electrical network infrastructure

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires the application of access procedures to work on or near electrical network infrastructure, to meet OHS, mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Apply access procedures to work on or near electrical network infrastructure.

Custom Content Section

Not applicable.

UETSS00019 Refresher - Apply ESI Safety Rules, Codes of Practice and Procedures for Work On or Near Electrical Apparatus

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency.

ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

UETDTRRF01B Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires the Application of ESI safety rules, codes of practice and procedures for work on or near electrical apparatus, to meet OHS, mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus.

Custom Content Section

Not applicable.

UETSS00020 Refresher - Perform Cable Pit-Trench-Excavation Rescue

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
3	Update		Update unit code in Target Group HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency.

ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

UETTDRRF07B Perform cable pit_trench_excavation rescue

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires workers to Perform cable pit/trench/excavation rescue, to meet OHS, mobility and mutual aid requirements.

Candidates must hold and shall be current in the unit:

HLTAID001 Provide cardiopulmonary resuscitation

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Perform cable pit/trench/excavation rescue.

Custom Content Section

Not applicable.

UETSS00021 Refresher - Perform Cable Pit-Trench-Excavation Rescue and CPR

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
2	Update		HLTCPR211A Perform CPR	

3	Update		HLTAID001 Provide cardiopulmonary resuscitation	
3	Update		Update unit code in Target Group HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency.

ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

HLTAID001 Provide cardiopulmonary resuscitation

UETDTRRF07B Perform cable pit_trench_excavation rescue

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires workers to Perform cable pit/trench/excavation rescue and CPR, to meet OHS, mobility and mutual aid requirements.

Candidates must hold and shall be current in the unit:

HLTAID001 Provide cardiopulmonary resuscitation

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Perform cable pit/trench/excavation rescue and CPR.

UETSS00022 Refresher - Perform CPR

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
2	Update		HLTCPR211A Perform CPR	
3	Update		HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency. ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

HLTAID001 Provide cardiopulmonary resuscitation

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires workers to Perform CPR, to meet OHS, mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Perform CPR.

Custom Content Section

Not applicable.

UETSS00023 Refresher - Perform EWP Controlled Descent Escape

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency.

ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

UETTDRRF08B Perform EWP controlled descent escape

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires workers to Perform EWP controlled descent escapes, to meet OHS, mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Perform EWP controlled descent escape.

Custom Content Section

Not applicable.

UETSS00024 Refresher - Perform EWP Rescue

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
2	Update		Update unit code in Target Group HLTCPR211A Perform CPR	
3	Update		Update unit code in Target Group HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency.

ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

UETDRRF03B Perform EWP rescue

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires workers to Perform EWP rescue, to meet OHS, mobility and mutual aid requirements.

Candidates must hold and shall be current in the unit:
HLTAID001 Provide cardiopulmonary resuscitation

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Perform EWP rescue.

Custom Content Section

Not applicable.

UETSS00025 Refresher - Perform EWP Rescue and CPR

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
2	Update		HLTCPR211A Perform CPR	10
2	Update		Added requirement to hold and be current in HLTCPR211A Perform CPR	

3	Update		HLTAID001 Provide cardiopulmonary resuscitation	
3	Update		Update unit code in Target Group HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not Applicable

Pathways Information

Pathway

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency.

ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Not Applicable

Skill Set Requirements

HLTAID001 Provide cardiopulmonary resuscitation

UETDRRF03B Perform EWP rescue

Target Group

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires workers to Perform EWP rescue and CPR, to meet OHS, mobility and mutual aid requirements. Candidates must hold and shall be current in the unit:
HLTAID001 Provide cardiopulmonary resuscitation

Suggested words for Statement of Attainment

Suggested form of words for Statement of Attainment This Skill Set from the UET09 ESI - Transmission, Distribution and Rail Training Package meets the industry requirements for Perform EWP rescue.

UETSS00026 Refresher - Perform Pole Top Rescue

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
2	Update		Update unit code in Target Group HLTCPR211A Perform CPR	
3	Update		Update unit code in Target Group HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency.

ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

UETDRRF02B Perform pole top rescue

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires the workers to Perform pole top rescues, to meet OHS, mobility and mutual aid requirements.

Candidates must hold and shall be current in the unit:

HLTAID001 Provide cardiopulmonary resuscitation

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Perform pole top rescue.

Custom Content Section

Not applicable.

UETSS00027 Refresher - Perform Pole Top Rescue and CPR

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
2	Update		HLTCPR211A Perform CPR	10
2	Update		Added requirement to hold and be current in HLTCPR211A Perform CPR	
3	Update		HLTAID001 Provide cardiopulmonary resuscitation	
3	Update		Update unit code in Target Group HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency.

ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

HLTAID001 Provide cardiopulmonary resuscitation

UETTDRRF02B Perform pole top rescue

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires Perform Pole Top Rescue and CPR, to meet OHS, mobility and mutual aid requirements.

Candidates must hold and shall be current in the unit:

HLTAID001 Provide cardiopulmonary resuscitation

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Perform Pole Top Rescue and CPR.

Custom Content Section

Not applicable.

UETSS00028 Refresher - Perform Rescue from a Live LV Panel

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
2	Update		Update unit code in Target Group HLTCPR211A Perform CPR	
3	Update		Update unit code in Target Group HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency. ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

UETDTRRF06B Perform rescue from a live LV panel

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires workers to Perform rescue from a live LV panel, to meet OHS, mobility and mutual aid requirements.

Candidates must hold and shall be current in the unit:
HLTAID001 Provide cardiopulmonary resuscitation

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Perform rescue from a live LV panel.

Custom Content Section

Not applicable.

UETSS00029 Refresher - Perform Rescue from a Live LV Panel and CPR

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
2	Update		HLTCPR211A Perform CPR	10
2	Update		Update unit code in Target Group HLTCPR211A Perform `CPR	
3	Update		HLTAID001 Provide cardiopulmonary resuscitation	
3	Update		Update unit code in Target Group HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency.

ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

HLTAID001 Provide cardiopulmonary resuscitation

UETTDRRF06B Perform rescue from a live LV panel

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires workers to Perform rescue from a live LV panel and CPR, to meet OHS, mobility and mutual aid requirements.

Candidates must hold and shall be current in the unit:

HLTAID001 Provide cardiopulmonary resuscitation

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Perform rescue from a live LV panel and CPR.

Custom Content Section

Not applicable.

UETSS00030 Refresher - Perform Rescue from Switchyard Structures at Heights

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
2	Update		Update unit code in Target Group HLTCPR211A Perform CPR	
3	Update		Update unit code in Target Group HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency. ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

UETTDRRF05B Perform rescue from switchyard structures at heights

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires workers to Perform rescue from switchyard structures at heights, to meet OHS, mobility and mutual aid requirements.

Candidates must hold and shall be current in the unit:

HLTAID001 Provide cardiopulmonary resuscitation

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Perform rescue from switchyard structures at heights.

Custom Content Section

Not applicable.

UETSS00031 Refresher - Perform Switchyard Rescue at Heights and Provide First Aid

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
2	Update		Update unit code in Target Group HLTCPR211A Perform CPR	
3	Update		Update unit code in Target Group HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency. ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

UETDTRRF05B Perform rescue from switchyard structures at heights
UETDTRRF10B Provide first aid in an ESI environment

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires Perform Switchyard Rescue at Heights and Provide First Aid, to meet OHS, mobility and mutual aid requirements.

Candidates must hold and shall be current in the unit:

HLTAID001 Provide cardiopulmonary resuscitation

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Perform Switchyard Rescue at Heights and Provide First Aid.

Custom Content Section

Not applicable.

UETSS00032 Refresher - Perform Tower Rescue

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
2	Update		Update unit code in Target Group HLTCPR211A Perform CPR	
3	Update		Update unit code in Target Group HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency. ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

UETDRRF04B Perform tower rescue

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires the workers to Perform tower rescue, to meet OHS, mobility and mutual aid requirements.

Candidates must hold and shall be current in the unit:

HLTAID001 Provide cardiopulmonary resuscitation

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Perform tower rescue.

Custom Content Section

Not applicable.

UETSS00033 Refresher - Perform Tower Rescue and Provide First Aid

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
2	Update		Update unit code in Target Group HLTCPR211A Perform CPR	
3	Update		Update unit code in Target Group HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency.

ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

UETTDRRF04B Perform tower rescue

UETTDRRF10B Provide first aid in an ESI environment

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires Perform Tower Rescue and Provide First Aid, to meet OHS, mobility and mutual aid requirements.

Candidates must hold and shall be current in the unit:
HLTAID001 Provide cardiopulmonary resuscitation

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Perform Tower Rescue and Provide First Aid.

Custom Content Section

Not applicable.

UETSS00034 Refresher - Provide First Aid in an ESI Environment

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	
2	Update		Update unit code in Target Group HLTCPR211A Perform CPR	
3	Update		Update unit code in Target Group HLTAID001 Provide cardiopulmonary resuscitation	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency.

ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

UETTDRRF10B Provide first aid in an ESI environment

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires workers to Provide first aid in an ESI environment, to meet OHS, mobility and mutual aid requirements.

Candidates must hold and shall be current in the unit:

HLTAID001 Provide cardiopulmonary resuscitation

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Provide first aid in an ESI environment.

Custom Content Section

Not applicable.

UETSS00035 Refresher - Testing of connections to low voltage electricity networks

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Mapped skill set requirements	

Description

Not applicable.

Pathways Information

This skill set does not provide any articulation to any qualification or other competency standard unit. The skill set has been developed by industry to provide for the mobility of ESI workers particularly with respect to mutual aid in times of emergency.

ESI employees are required to maintain currency in the Unit(s) in this skill set for authorisation/approval to work on ESI Networks.

Licensing/Regulatory Information

Readers should ensure that they have also read the part of the Training Package that outlines licensing and regulatory requirements.

Skill Set Requirements

UETDTRRF11A Testing of connections to low voltage electricity networks

Target Group

Electricity Supply Industry workers who undertake the installation and/or maintenance of network infrastructure which requires workers to Perform EWP rescue, to meet OHS, mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This Skill Set from the UET12 ESI – Transmission, Distribution and Rail Training Package meets the industry requirements for Testing of connections to low voltage electricity networks.

Custom Content Section

Not applicable.

UETTDRCJ21A Lay ESI electrical cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the laying of cables for electrical purposes and includes the laying of ducts and/or conduit for such cables. It could include direct laying of cables in trenches, on racks, in troughs and /or in conduit or ducts. It also encompasses cable pulling methods, pulling tensions, minimum bending radii, reduction of frictional forces, use of supporting plant (e.g. dynamometers, rigging, winches), working on FRC, PVC, A/C ducted systems and the sealing of cables.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice**3)**

safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to lay electrical cables	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received and confirmed, if necessary, by site inspection
	1.2 Relevant requirements and established procedures for the work are discussed with other personnel and identified for all work sites
	1.3 OHS policies and procedures related to requirements and established procedures for the laying of electrical cables are obtained and confirmed for the purposes of the work to be performed and communicated
	1.4 Work is prioritised and sequenced following consultation with others for completion within

ELEMENT	PERFORMANCE CRITERIA
	acceptable timeframes and in accordance with established procedures
1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
1.6	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
1.7	Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
1.8	Relevant personnel at work site are confirmed current in First Aid and other related work procedures according to requirements.
1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
1.12	Traffic management plan is identified and implemented.
2 Carry out the laying of electrical cables	2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment,

ELEMENT**PERFORMANCE CRITERIA**

- techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Essential knowledge and associated skills are applied in the safe laying of electrical cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.4 Electrical cables are laid in accordance with the work schedule and requirements/established procedures.
- 2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.6 Unplanned events in the laying of electrical cables are undertaken within the scope of established procedures.
- 2.7 Known solutions to a variety of problems are applied using routine procedures.
- 2.8 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 3 Complete the laying of electrical cables
- 3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
- 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures.
- 3.5 Relevant work permit(s), works completion records, reports, drawings and/or documentation

ELEMENT**PERFORMANCE CRITERIA**

and information are actually completed and appropriate personnel notified.

- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of laying ESI electrical cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ21A Underground cable installation and safety

Evidence shall show an understanding of the installation of underground cable to an extent indicated by the following aspects:

T1 Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings

T2 Safety precautions specific to the installation of underground cable encompassing:

- Excavation and trench safety regulations
- Gas detection procedures
- Working in confined spaces
- Personal protective equipment
- Hazards for the use of LPG equipment for jointing of underground cable
- Gas bottle testing procedures
- Permit to work systems and isolation procedures
- Trench excavation and reinstatement procedures
- Rescue victims from confined spaces

Note: Examples include planning, identifying the procedures and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR.

T3 Installation of underground cable procedures encompassing:

- Types of tools and equipment

T4 Methods of cable handling encompassing:

- Direct laid cables
- Duct laid cables
- Solid laid cables
- Cables supported in cleats or hangers
- Corrosion protection
- Minimum bending radius of cables

T5 Methods of cable sealing encompassing:

- Shorting of cables cores

REQUIRED SKILLS AND KNOWLEDGE

- Core of unterminated cables
- Methods of protection from corrosion
- Polymeric sheathed cables sealing with mastic lined
- Heat shrink caps buried sealed ends

T6 Methods of installing conduits

T7 Procedures for the safe use of LPG equipment for cable jointing

T8 Traffic management

Note: Examples include purpose of traffic management and a power worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio

T9 Procedures for purchasing/ordering items, removing/dispatching items, stocktaking, and record keeping

KS02-TCJ21A Underground cable construction

Evidence shall show an understanding of the construction and types of underground cables to an extent indicated by the following aspects:

T1 Safety precautions specific to handling underground cables

T2 Requirements for the use of enterprise manuals, system diagrams/plans and drawings

T3 Types and applications of underground cables

T4 Construction types and structures of underground cables

T5 Characteristics of different types of underground cables

T6 Ratings

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to	Item List

	be demonstrated	
A	At least one of the following:	HV polymeric HV paper insulated
B	At least one of the following:	LV polymeric LV paper insulated
C	At least one of the following:	Direct lay On racks In conduits
D	At least one cable pulling methods of the following:	Stocking pulling Bond pulling Armour pulling Nose pull attachments
E	At least two cable sealing methods of the following:	Heat shrinkable Pre-stretched materials Tin/lead wiping Pre-moulded components
F	At least one cable cutting methods of the following:	Hydraulic cutters Electric reciprocating Motorised Hand tools
G	At least four of the following:	Drum jacks Winches Spindles Capstans Bollards Cable trailers Rollers Lubricants Ropes Bell mouths

		Draw wires/rods
H	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this Competency Standard Unit.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills

described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRCJ2 Install and maintain de-energised low voltage
2A underground paper insulated cables.

 UETT Install and maintain de-energised low voltage
DRCJ26A underground polymeric cables.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the laying of cables for electrical purposes and includes the laying of ducts and/or conduit for electrical cables.

The unit includes the laying of cables direct in trenches, on racks, in troughs and /or in conduit or ducts.

It also encompasses cable pulling methods, pulling tensions, minimum bending radii, reduction of frictional forces, use of supporting plant (e.g. dynamometers, rigging, winches, etc), working on FRC, PVC, A/C ducted systems and the cutting and sealing of cables.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification

RANGE STATEMENT

- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Cable Jointing

UETTDRCJ22A Install and maintain de-energised low voltage underground paper insulated cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of de-energised low voltage underground paper insulated cables and covers the jointing, terminating, repair and replacement of cables. It includes the isolation of systems and circuits, the procedure of issuing/accepting electrical access permits, the undertaking of pre-commissioning tests and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits

Prerequisite Unit(s)

4)

UETTDRCJ21A	Lay ESI electrical cables
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDREL16A	Working safely near live electrical apparatus
UETTDRLS41A	Install network infrastructure electrical equipment
UETTDRLS42A	Maintain network infrastructure electrical equipment
UETTDRLS55A	Install and maintain low voltage underground services

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare for the installation and maintenance of de-energised LV underground paper insulated cables	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection
	1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites
	1.3	OHS policies and procedures related to requirements and established procedures for the installation and maintenance of de-energised LV underground paper insulated cables are obtained and confirmed for the purposes of the work to be performed and communicated
	1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented

ELEMENT

PERFORMANCE CRITERIA

- and monitored including emergency exits kept clear according to established procedures.
- 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.8 Relevant personnel at work site are confirmed current in First Aid and other related work procedures according to requirements
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures
- 1.12 Traffic management plan is identified and implemented.
- 2 Carry out installation and maintenance of de-energised LV underground paper insulated cables
- 2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
- 2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed
- 2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the

ELEMENT

PERFORMANCE CRITERIA

		requirements/permits and established procedures
	2.4	Essential knowledge and associated skills are applied in the safe installation and maintenance of de-energised LV underground paper insulated cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements
	2.5	De-energised LV underground paper insulated cables are installed according to the work schedule and requirements/established procedures
	2.6	Maintenance, including repair and/or replacement of de-energised LV underground paper insulated cables is carried out, in accordance with the work schedule and requirements/established procedures
	2.7	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.8	Unplanned events in the installation and maintenance of de-energised LV underground paper insulated cables are undertaken within the scope of established procedures
	2.9	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.10	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3	Complete the installation and maintenance of de-energised LV underground paper insulated cables	
	3.1	Work undertaken is visually checked/tested against works schedule for confirmation of phasing and conformance with requirements and, anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.

ELEMENT

PERFORMANCE CRITERIA

- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures
- 3.5 Relevant work permit(s) are signed off and, the LV underground paper insulated cables are returned to service in accordance with requirements
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining de-energised LV underground paper insulated cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ22A LV Aluminium and lead sheathed cable jointing

Evidence shall show an understanding of the construction and types of underground cables to an extent indicated by the following aspects:

- T1 Safety precautions specific to handling and jointing underground aluminium and lead cable including provision of OHS information such as material safety data sheets (MSDS)
- T2 Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- T3 Construction and structure(s) of aluminium and lead cable underground cables
- T4 Characteristics of aluminium and lead cable
- T5 Ratings
- T6 Techniques in the jointing of aluminium and lead sheathed cable
- T7 Methods of testing cable after jointing

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment,

such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools, equipment, materials, procedures, workplaces or other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least one of the following:	LV paper/lead sheathed LV paper/aluminium sheathed
B	At least two of the following:	Tee-off joints Straight through joints Parallel branch joints Parallel joints
C	At least two of the following:	Transformers LV switchboards Pillars/turrets

		<p>Lighting columns</p> <p>Ring main units</p> <p>Chamber substations</p> <p>UG/OH terminations</p> <p>Circuit breakers</p>
D	At least one of the following:	<p>Busbar/termination boxes</p> <p>Links/Fuses</p> <p>Disconnect boxes</p> <p>Termination boxes</p> <p>Control gear</p>
E	At least one of the following:	<p>Resin filled boxes</p> <p>Polymeric tape</p> <p>Heat shrink</p> <p>'slip-on' moulds</p> <p>Pre-stretched polymeric</p> <p>Compound filled boxes</p>
F	At least one of the following:	<p>Compression lugs</p> <p>Soldered lugs</p> <p>Mechanical connectors</p>
G	At least one of the following:	<p>Voltage detectors</p> <p>Insulation resistance testers</p>
H	At least one occasion	<p>Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.</p>

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this Competency Standard Unit.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRJ2 Lay ESI electrical cables

1A

UETTDRCJ2 Install and maintain de-energised high voltage
3A underground paper insulated cables.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of de-energised low voltage underground paper insulated cables and covers the jointing, terminating, repair and replacement of cables.

Installation and Maintenance may include the repair and replacement of cables and associated hardware.

Types of cables includes: Paper-Insulated which refers to LV solid paper insulated metal sheathed.

Underground equipment may include links, fuses, disconnect boxes, ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations, LV switchboards, pillars/turrets, busbar/termination boxes, street lighting control gear and street lighting columns.

Test and recording equipment may include voltage detectors, tong ammeters, cable identification equipment, cable fault locating equipment and insulation resistance testers.

Jointing and terminating materials may include compound and resin filled boxes, paper tape materials, polymeric tape materials, polymeric heat shrink materials, "slip-on" moulded components and pre-stretched polymeric materials, compression, mechanical, welded and solder lugs and ferrules.

Jointing and terminating locations may include links, fuses, disconnect boxes, ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations, LV switchboards, pillars/turrets, busbar/termination boxes, street lighting control points and street lighting columns.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information

RANGE STATEMENT

- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Cable Jointing

UETTDRCJ23A Install and maintain de-energised high voltage underground paper insulated cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of de-energised high voltage underground paper insulated cables and covers the jointing, terminating, repair and replacement of cables. It includes the isolation and earthing of systems and circuits, the procedure of issuing/accepting electrical access permits, the undertaking of pre-commissioning tests as per enterprise established procedures and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice

3)

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits

Prerequisite Unit(s)

4)

UETTDRCJ21A	Lay ESI electrical cables
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDREL16A	Working safely near live electrical apparatus
UETTDRLS41A	Install network infrastructure electrical equipment
UETTDRLS42A	Maintain network infrastructure electrical equipment
UETTDRLS55A	Install and maintain low voltage underground services

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare for the installation and maintenance of de-energised HV underground paper insulated cables	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection
	1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites
	1.3	OHS policies and procedures related to requirements and established procedures for the installation and maintenance of de-energised HV underground paper insulated cables are obtained and confirmed for the purposes of the work to be performed and communicated
	1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented

ELEMENT

PERFORMANCE CRITERIA

- and monitored including emergency exits kept clear according to established procedures.
- 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.8 Relevant personnel at work site are confirmed current in First Aid and other related work procedures according to requirements
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures
- 1.12 Traffic management plan is identified and implemented.
- 2 Carry out installation and maintenance of de-energised HV underground paper insulated cables
- 2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
- 2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed
- 2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the

ELEMENT	PERFORMANCE CRITERIA
	requirements/permits and established procedures
2.4	Essential knowledge and associated skills are applied in the safe installation and maintenance of de-energised HV underground paper insulated cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements
2.5	De-energised HV underground paper insulated cables are installed according the work schedule and requirements/established procedures
2.6	Maintenance, including repair and/or replacement of de-energised HV underground paper insulated cables is carried out, in accordance with the work schedule and requirements/established procedures
2.7	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures
2.8	Unplanned events in the installation and maintenance of de-energised HV underground paper insulated cables are undertaken within the scope of established procedures
2.9	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
2.10	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the installation and maintenance of de-energised HV underground paper insulated cables	3.1 Work undertaken is visually checked/tested against works schedule for confirmation of phasing and conformance with requirements and, anomalies reported in accordance with established procedures
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.

ELEMENT

PERFORMANCE CRITERIA

- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures
- 3.5 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining de-energised HV underground paper insulated cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ23A HV Paper lead cable jointing

Evidence shall show an understanding of the jointing HV paper lead/lead type cables to an extent indicated by the following aspects:

- T1 Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- T2 Types of tools, equipment
- T3 Types of HV cables
- T4 Structure of HV cables
- T5 Technique for the jointing, terminating and repairing of HV paper lead insulated cables
- T6 Methods of testing cable after jointing

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of 9.1) Assessment

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this

shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
- Apply sustainable energy principles and practices as specified in the performance criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools, equipment, materials, procedures, workplaces or other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least one of the following:	Paper/lead sheathed HV Paper/Aluminium sheathed
B	At least one of the following:	Straight through joint Parallel branch joint
C	At least one of the following:	Transformers Ring main units Chamber substations
D	At least one of the following:	Busbar/termination boxes Links/ Fuses Termination boxes

		Control gear
E	At least two of the following:	Resin filled boxes Polymeric tape Heat shrink Slip-on' moulds Pre-stretched polymeric Compound filled boxes
F	At least two of the following:	Lugs, Ferrules Compression joints Soldered joints Mechanical Connectors
G	All of the following:	Cable Identification devices Cable Spiking Devices
H	All of the following:	Insulation resistance testers Moisture testing equipment
I	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this Competency Standard Unit.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRCJ2 Lay ESI electrical cables
1A

UETTDRCJ2 Install and maintain de-energised low voltage
2A underground paper insulated cables.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of de-energised high voltage underground paper insulated cables and covers the jointing, terminating, repair and replacement of cables.

Installation and Maintenance may include the repair and replacement of cables and associated hardware.

Types of cables includes: Paper-Insulated which refers to HV solid paper insulated metal sheathed.

Underground equipment may include links, fuses, , ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations, busbar/termination boxes.

Test and recording equipment includes voltage detectors, tong ammeters, cable identification equipment, Cable spiking equipment and insulation resistance testers.

Jointing and terminating materials include compound and resin filled boxes, paper tape materials, polymeric tape materials, polymeric heat shrink materials, "slip-on" moulded components and pre-stretched polymeric materials, compression, mechanical and solder lugs and ferrules.

Jointing and terminating locations include links, fuses, , ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations, , busbar/termination boxes.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures

RANGE STATEMENT

- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.
- Testing procedures
- Work clearance systems.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Cable Jointing

UETTDRCJ24A Joint and maintain energised low voltage underground paper insulated cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the jointing and maintenance of energised low voltage underground paper insulated cables according to established enterprise procedures. It covers the use of specialised live working equipment, tools and devices, the issuing and/or accepting electrical access permits and/or relevant working documentation and the undertaking of authorised cable testing procedures. It also encompasses the pre-commissioning tests and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice

3)

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c.

Prerequisite Unit(s)	4)	Circuits
	UETTDRCJ21A	Lay ESI electrical cables
	UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
	UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRLS41A	Install network infrastructure electrical equipment
	UETTDRLS42A	Maintain network infrastructure electrical equipment
	UETTDRLS55A	Install and maintain low voltage underground services

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare for the jointing and maintenance of energised LV underground paper insulated cables	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites
	1.3 OHS policies and procedures related to requirements and established procedures for the jointing and maintenance of energised LV underground paper insulated cables are obtained and confirmed for the purposes of the work to be performed and communicated
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented

ELEMENT

PERFORMANCE CRITERIA

- and monitored including emergency exits kept clear according to established procedures.
- 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
 - 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
 - 1.8 Specialist equipment for live working is inspected and confirmed in working order as per requirements and established procedures
 - 1.9 Relevant personnel at work site are confirmed current in First Aid and other related work procedures according to requirements
 - 1.10 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
 - 1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
 - 1.12 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures
- 2 Carry out jointing and maintenance of energised LV underground paper insulated cables
- 2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
 - 2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed

ELEMENT

PERFORMANCE CRITERIA

- 2.3 Essential knowledge and associated skills are applied in the safe jointing and maintenance of energised LV underground paper insulated cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements
- 2.4 Cable(s), underground equipment, associated hardware and surrounds are prepared in accordance with established procedures
- 2.5 Joint and termination procedures of energised LV cable(s) are carried out in accordance with the work schedule and requirements/established procedures
- 2.6 Authorised cable testing procedures and fault identification and location process are implemented in accordance with requirements and established procedures
- 2.7 Maintenance, including repair and/or replacement of energised LV underground paper insulated cables is carried out, in accordance with the work schedule and requirements/established procedures
- 2.8 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.9 Unplanned events in the jointing and maintenance of energised LV underground paper insulated cables are undertaken within the scope of established procedures
- 2.10 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
- 2.11 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
- 2.12 OHS, sustainable energy and environmental principles and practices to reduce the incidents of

ELEMENT

PERFORMANCE CRITERIA

		accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
3	Complete the jointing and maintenance of energised LV underground paper insulated cables	<p>3.1 Work undertaken is checked against works schedule for conformance with requirements and, anomalies reported in accordance with established procedures</p> <p>3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.</p> <p>3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures</p> <p>3.4 Relevant work permit(s) are signed off and, jointing and maintenance of energised LV underground paper insulated cables are returned to service in accordance with requirements</p> <p>3.5 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of jointing and maintaining energised LV underground paper insulated cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ24A LV energised working practices for paper lead cable jointing

Evidence shall show an understanding of the safe working on energised low voltage equipment to an extent indicated by the following aspects:

T1 Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements

T2 Safety precautions specific to working on or near energised low voltage conductors encompassing:

- Safe working practices and procedures
- Identification of hazards, assessment and control of OHS risks
- Types, selection, maintenance and use of personal protective equipment

T3 Work on or near energised LV paper lead cables encompassing:

- Types and function of specialised tools
- Safe working practices when using specialised tools
- Methods of using specialised tools
- Safe procedures for work on panels and in cubicles on or near energised LV paper lead cables

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools, equipment, materials, procedures, workplaces or other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List

A	At least one of the following:	LV paper/lead LV paper/aluminium
B	At least two of the following:	Tee-off joints Straight through joints Parallel branch
C	At least one of the following:	Transformers LV switchboards Pillars/turrets Lighting columns Ring main units Chamber substations Busbar/termination boxes Links Termination boxes Control gear
D	At least one of the following:	Resin filled boxes Compound filled boxes Polymeric tape Heat shrink 'slip-on' moulds Pre-stretched polymeric
E	At least two of the following:	Compression joints Soldered joints Mechanical connectors Soldered lugs Compression lugs
F	All of the following:	Voltage detecting instruments Insulation resistance testers Cable identification equipment

		Moisture testing equipment Phase rotation instruments Specialised live working equipment/tools
G	All of the following:	Temporary earth bonding/bridging, Insulating covers/matting Insulating tooling/gloves
H	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this Competency Standard Unit.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRCJ2 Joint and maintain energised low voltage
8A underground polymeric cables

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the jointing and maintenance of energised low voltage underground paper insulated cables and covers the jointing, repair and replacement of cables using specialised live working equipment, tools and devices.

Installation and Maintenance may include the repair and replacement of cables and associated hardware.

Types of cables includes: Paper-Insulated which refers to LV solid paper insulated metal sheathed.

Underground equipment may include straight and branch joints, ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations, LV switchboards, pillars/turrets, busbar/termination boxes, street lighting control gear and street lighting columns.

Test and recording equipment includes voltage detectors, tong ammeters, cable identification equipment and insulation resistance testers.

Jointing and terminating materials include compound and resin filled boxes, paper tape materials, polymeric tape materials, polymeric heat shrink materials, "slip-on" moulded components and pre-stretched polymeric materials, compression and solder lugs and ferrules and mechanical connectors.

Jointing and terminating locations include, ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations, LV switchboards, pillars/turrets, busbar/termination boxes, street lighting control points and street lighting columns.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.

RANGE STATEMENT

- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.
- Testing procedures
- Work clearance systems.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Cable Jointing

UETTDRCJ25A Perform straight through high voltage paper insulated to polymeric transition joint

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the formation of a HV/LV transition joint(s) from paper insulated to polymeric cable on belted and screened cables and covers the; determination of electrical values of belt papers and core insulation, protection of core and belt papers prior to setting, core setting, termination of belt papers, construction of bell mouth and moisture testing. It includes the isolation of systems and circuits, the procedure of issuing/accepting electrical access permits, the undertaking of pre-commissioning and/or re-commissioning tests and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place

License to practice

3)

subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic

Prerequisite Unit(s)	4)	devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDRCJ21A	Lay ESI electrical cables
	UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
	UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRLS41A	Install network infrastructure electrical equipment
	UETTDRLS42A	Maintain network infrastructure electrical equipment
	UETTDRLS55A	Install and maintain low voltage underground services

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|---|--|
| 1 Prepare for the formation of a paper insulated to polymeric transition joint. | 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection |
| | 1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites |
| | 1.3 OHS policies and procedures related to requirements and established procedures for the formation of a paper insulated to polymeric transition joint are obtained and confirmed for the purposes of the work to be performed and communicated |
| | 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures |
| | 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented |

ELEMENT

PERFORMANCE CRITERIA

- and monitored including emergency exits kept clear according to established procedures.
- 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.8 Relevant personnel at work site are confirmed current in First Aid and other related work procedures according to requirements
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures
- 1.12 Road signs, barriers and warning devices are positioned in accordance with requirements
- 2 Carry out the formation of a paper insulated to polymeric transition joint
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
- 2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed
- 2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the

ELEMENT

PERFORMANCE CRITERIA

- requirements/permits and established procedures
- 2.4 Essential knowledge and associated skills are applied in the safe formation of a transition paper insulated to polymeric cable joint to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements
- 2.5 A transition paper insulated to polymeric cable joint is formed according the work schedule and requirements/established procedures
- 2.6 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.7 Unplanned events in the formation of a transition paper insulated to polymeric cable joint are undertaken within the scope of established procedures
- 2.8 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
- 2.9 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
- 3 Complete the formation of a paper insulated to polymeric transition joint
- 3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures
- 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

ELEMENT

PERFORMANCE CRITERIA

- 3.5 Relevant work permit(s) are signed off and, HV/LV underground paper insulated/polymeric cables are returned to service in accordance with requirements
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of performing straight through HV paper insulated to polymeric transition joints.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ25A HV Transition Cable Jointing

Evidence shall show an understanding of the jointing HV transition joints to an extent indicated by the following aspects:

- T1 Safety precautions specific to handling and jointing underground aluminium and lead cable including provision of OHS information such as material safety data sheets (MSDS)
- T2 Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- T3 Types of tools and equipment
- T4 Technique for the jointing of transition joint between XLPE and lead sheathed, paper insulated cables
- T5 Methods of testing cable after jointing

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least two of the following:	HV polymeric to PLY HV polymeric to Paper/Al sheathed LV Transition
B	At least two of the following:	Straight through joint Straight through trifurcating joint Parallel branch joint Parallel Trifurcating Transition Parallel Transition
C	At least two of the following:	Polymeric tape Heat shrink 'Slip-on' moulds Pre-stretched polymeric resin
D	At least two of the following:	Compression joints Soldered joints Mechanical connectors Welding conductors Insulating piercing connectors
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this Competency Standard Unit.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRJ2 Install and maintain de-energised high voltage

7A underground polymeric cables.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the creation of a transition joint for paper insulated to polymeric cables and covers the jointing, repairing and replacement of cables used in systems and circuits and the issuing/accepting of relevant permits.

Types of cables includes: Polymeric cables (i.e. HV/LV de-energised – rigid or flexible) and Paper-Insulated Lead and Aluminium sheathed cables (screened or unscreened) (copper or aluminium conductors).

Jointing and terminating materials include compound and resin filled boxes, paper tape materials, polymeric tape materials, polymeric heat shrink materials, "slip-on" moulded components and pre-stretched polymeric materials, compression, and mechanical connectors.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation

RANGE STATEMENT

- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Cable Jointing

UETTDRCJ26A Install and maintain de-energised low voltage underground polymeric cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of de-energised low voltage underground polymeric cables and covers the jointing, terminating, repair and replacement of cables. It includes the isolation of systems and circuits, the procedure of issuing/accepting electrical access permits, the undertaking of pre-commissioning and/or re-commissioning tests and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice

3)

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UETTDRCJ21A	Lay ESI electrical cables
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|--|-----|--|
| 1 | Prepare for the installation and maintenance of de-energised LV underground polymeric cables | 1.1 | Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection |
| | | 1.2 | Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites |

ELEMENT

PERFORMANCE CRITERIA

- 1.3 OHS policies and procedures related to requirements and established procedures for the installation and maintenance of de-energised LV underground polymeric cables are obtained and confirmed for the purposes of the work to be performed and communicated
- 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
- 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order
- 1.8 Relevant personnel at work site are confirmed current in First Aid and other related work procedures according to requirements
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures
- 1.12 Road signs, barriers and warning devices are

ELEMENT

PERFORMANCE CRITERIA

		positioned in accordance with requirements
2	Carry out the installation and maintenance of de-energised LV underground polymeric cables	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures</p> <p>2.2 Lifting, climbing, working in confined spaces and working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed</p> <p>2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures</p> <p>2.4 Essential knowledge and associated skills are applied for the safe installation and maintenance of de-energised LV underground polymeric cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements</p> <p>2.5 De-energised LV underground polymeric cables are installed according to the work schedule and requirements/established procedures</p> <p>2.6 Maintenance, including repair and/or replacement of LV underground polymeric cables is carried out, in accordance with the work schedule and requirements/established procedures</p> <p>2.7 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.8 Unplanned events in the installation and maintenance of de-energised LV underground polymeric cables are undertaken within the scope of established procedures</p> <p>2.9 Known solutions to a variety of problems are applied using acquired essential knowledge and</p>

ELEMENT	PERFORMANCE CRITERIA
	associated skills
	2.10 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the installation and maintenance of de-energised LV underground polymeric cables	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5 Relevant work permit(s) are signed off and LV underground polymeric cables are returned to service in accordance with requirements
	3.6 Works completion records, reports, drawings and/or documentation and information are finalised and processed and appropriate personnel notified

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining de-energised LV underground polymeric cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ26A LV Polymeric cable jointing

Evidence shall show an understanding of the types of cables, tools and equipment used in the jointing and termination of LV polymeric cable to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the jointing of LV polymeric cables

T2 Types of jointing tools

T3 Techniques in the use of LPG encompassing:

- Safety precautions
- Personal protective equipment
- General maintenance and repair

T4 Techniques in jointing LV XLPE cables encompassing:

- Straight through joint
- Jointing different types of cable
- Service and street light cable joints

T5 Techniques in terminating LV XLPE encompassing:

- Pole top terminations
- Substation terminations
- Distribution pillar/column/cubicle terminations
- Service and street light cable terminations

T6 Techniques in repairing LV XLPE cable encompassing:

- Different types of damage
- Repairs to sheath
- Repairs to cores

T7 Methods of testing cable after jointing

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	LV polymeric cable
B	Any two of the following:	Tee-off joints Straight through joints Parallel branch joints Parallel joints
C	At least one of the following:	Transformers, LV switchboards Pillars/turrets Lighting columns Ring main units Chamber substations
D	At least two of the following:	Busbar/termination boxes Links/Fuses Disconnect boxes Termination boxes Control gear UG/OH terminations Circuit breakers
E	At least one of the following:	Resin filled boxes, Compound filled boxes Polymeric tape Heat shrink Slip-on' moulds Pre-stretched polymeric
F	At least one of the following:	Compression lugs Welded connections Mechanical connectors Insulation piercing connectors
G	All of the following:	Insulation resistance

		testers Voltage detectors
H	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance on de-energised low voltage underground polymeric cables.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and

demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRCJ2 2A Install and maintain de-energised low voltage underground paper insulated cables.

UETTDRCJ2 7A Install and maintain de-energised high voltage underground polymeric cables.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of de-energised low voltage underground polymeric cables and covers the jointing, terminating, repair and replacement of cables used in systems and circuits and the issuing/accepting of relevant permits.

Test and recording equipment may include voltage detectors, tong ammeters, cable identification equipment, and insulation resistance testers.

Jointing and terminating materials may include compound and resin filled boxes, polymeric tape materials, polymeric heat shrink materials, "slip-on" moulded components and pre-stretched polymeric materials, compression, welded and mechanical connectors.

Jointing and terminating equipment and locations may include links, fuses, disconnect boxes, ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations, LV switchboards, pillars/turrets, busbar/termination boxes, street lighting control points and street lighting columns.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards

RANGE STATEMENT

- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
Cable Jointing

UETTDRCJ27A Install and maintain de-energised high voltage underground polymeric cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of de-energised high voltage underground polymeric cables and covers the jointing, terminating, repair and replacement of cables. It includes the isolation of systems and circuits, the procedure of issuing/accepting electrical access permits, the undertaking of pre-commissioning and/or re-commissioning tests and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice

3)

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UETTDRCJ21A	Lay ESI electrical cables
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
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Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to the installation and maintenance of de-energised HV underground polymeric cables	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
	1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.

ELEMENT

PERFORMANCE CRITERIA

- 1.3 OHS policies and procedures related to requirements and established procedures for the installation and maintenance of de-energised HV underground polymeric cables are obtained and confirmed for the purposes of the work to be performed and communicated.
- 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
- 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.8 Relevant personnel at work site are confirmed current in First Aid and other related work procedures according to requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Road signs, barriers and warning devices are

ELEMENT

PERFORMANCE CRITERIA

		positioned in accordance with requirements.
2	Carry out the installation and maintenance of de-energised HV underground polymeric cables	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.</p> <p>2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.</p> <p>2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.</p> <p>2.4 Essential knowledge and associated skills are applied in the safe installation and maintenance of de-energised HV underground polymeric cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.5 De-energised HV underground polymeric cables are installed according the work schedule and requirements/established procedures.</p> <p>2.6 Maintenance, including repair and/or replacement of de-energised HV underground polymeric cables is carried out, in accordance with the work schedule and requirements/established procedures.</p> <p>2.7 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.8 Unplanned events in the installation and maintenance of de-energised HV underground polymeric cables are undertaken within the scope of established procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
	2.9 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.10 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the installation and maintenance of de-energised HV underground polymeric cables	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, HV underground polymeric cables are returned to service in accordance with requirements.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining de-energised HV underground polymeric cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ27A HV Polymeric underground cable jointing

Evidence shall show an understanding of the jointing and termination of HV polymeric cable to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the jointing of HV underground polymeric cables

T2 Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, encompassing:

- Characteristics of different types of cables and components
- Purpose of stress control

T3 Applications of various tools and equipment for HV jointing

T4 Procedure for isolating high voltage underground cables encompassing:

- Method for proving safe to work

T5 Earthing procedures

T6 Techniques in jointing HV underground polymeric cable, encompassing:

- Short circuit cores and seal cable
- Straight through
- Trifurcating

T7 Techniques in HV terminations encompassing:

- Pole top termination
- Substation/switchgear termination
- ABC termination
- Telcon termination

T8 Procedures for repairing HV underground cables encompassing:

- Location of faults
- Types of damage
- Techniques to repairs to sheath
- Techniques to repairs to core

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to	Item List

	be demonstrated	
A	All of the following:	HV polymeric cables
B	At least two of the following:	Tee-off joints Straight through joint Parallel branch joint Parallel joint
C	At least one of the following:	Transformers Ring main units Chamber substations
D	At least one of the following:	Busbar/termination boxes Links/Fuses Termination boxes Control gear Circuit breakers
E	At least two of the following:	Resin filled boxes Compound filled boxes Polymeric tape Heat shrink 'slip-on' moulds Pre-stretched polymeric
F	All of the following:	Insulation resistance testers Voltage detectors
G	All of the following;	Cable identification devices Cable spiking devices
H	At least two of the following:	Mechanical connectors Compression connectors Lugs
I	At least one	Dealing with an

	occasion	unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of de-energised underground HV polymeric cables.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRCJ2 6A Install and maintain de-energised low voltage underground polymeric cables

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of de-energised high voltage underground polymeric cables and covers the jointing, terminating, repair and replacement of cables used in systems and circuits and the issuing/accepting of relevant permits.

Underground equipment may include links, fuses, ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations and busbar/termination boxes.

Test and recording equipment includes voltage detectors, cable identification equipment, cable spiking equipment and insulation resistance testers.

Jointing and terminating materials include compound and resin filled boxes, polymeric tape materials, polymeric heat shrink materials, "slip-on" moulded components and pre-stretched polymeric materials, compression and mechanical connectors

Jointing and terminating locations include circuit breakers, links, fuses, ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations and busbar/termination boxes.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures

RANGE STATEMENT

- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements.
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Cable Jointing

UETTDRCJ28A Joint and maintain energised low voltage underground polymeric cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the jointing and maintenance of energised low voltage underground polymeric cables according to established enterprise procedures. It covers the use of specialised live working equipment, tools and devices, the issuing and/or accepting electrical access permits and or relevant working documentation and the undertaking of authorised cable testing procedures. It also encompasses the pre-commissioning and/or re-commissioning tests and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice

3)

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c.

Prerequisite Unit(s)	4)	Circuits
	UETTDRCJ21A	Lay ESI electrical cables
	UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
	UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRLS41A	Install network infrastructure electrical equipment
	UETTDRLS42A	Maintain network infrastructure electrical equipment
	UETTDRLS55A	Install and maintain low voltage underground services

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare for the jointing and maintenance of energised LV underground polymeric cables	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
	1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3	OHS policies and procedures related to requirements and established procedures for the jointing and maintenance of energised LV underground polymeric cables are obtained and confirmed for the purposes of the work to be performed and communicated.
	1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
	1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented

ELEMENT

PERFORMANCE CRITERIA

- and monitored including emergency exits kept clear according to established procedures.
- 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.8 Specialist equipment for live working is inspected and confirmed in working order as per requirements and established procedures.
- 1.9 Relevant personnel at work site are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
- 1.10 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.12 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.13 Road signs, barriers and warning devices are positioned in accordance with requirements.
- 2 Carry out jointing and maintenance of energised LV underground polymeric cables
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
- 2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment,

ELEMENT

PERFORMANCE CRITERIA

- techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Essential knowledge and associated skills are applied in the safe jointing and maintenance of energised LV underground polymeric cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.4 Cable(s), underground equipment, associated hardware and surrounds are prepared in accordance with established procedures.
- 2.5 Joint and termination procedures of energised LV cable(s) are carried out in accordance with the work schedule and requirements/established procedures.
- 2.6 Authorised cable testing procedures and fault identification and location process are implemented in accordance with requirements and established procedures.
- 2.7 Maintenance, including repair and/or replacement of energised LV underground polymeric cables is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.8 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.9 Unplanned events in the jointing and maintenance of energised LV underground polymeric cables are undertaken within the scope of established procedures.
- 2.10 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.11 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the jointing and maintenance of energised LV underground polymeric cables	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, LV underground polymeric cables are returned to service in accordance with requirements.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of jointing and maintaining energised LV underground polymeric cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ28A Low voltage energised working practices for polymeric cable jointing

Evidence shall show an understanding of the safe working on energised low voltage equipment to an extent indicated by the following aspects:

T1 Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements

T2 Safety precautions specific to working on or near energised low voltage conductors encompassing:

- Safe working practices and procedures
- Identification of hazards, assessment and control of OHS risks
- Types, selection, maintenance and use of personal protective equipment

T3 Work on or near energised LV polymeric cables encompassing:

- Types and function of specialised tools
- Safe working practices when using specialised tools
- Methods of using specialised tools
- Safe procedures for work on panels and in cubicles on or near energised LV polymeric cables

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	LV polymeric cables
B	At least two of the following:	Tee-off joints Straight through joints Parallel branch joints Parallel joints
C	At least one of the following:	Transformers LV switchboards Pillars/turrets Lighting columns Ring main units Chamber substations
D	At least one of the following:	Busbar/termination boxes Links/fuses Termination boxes Control gear
E	At least one of the following:	Resin filled boxes Polymeric tape Heat shrink 'slip-on' moulds Pre-stretched polymeric
F	At least two of the following:	Compression joints/lugs Insulation piercing connectors Mechanical connectors
G	All of the following:	Voltage detecting instruments Insulation resistance testers Cable identification equipment

		Phase rotation instruments Specialised live working equipment/tools.
H	All of the following:	Temporary earth bonding/bridging Insulating covers/matting Insulating tooling /gloves
I	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual jointing and maintenance of energised underground LV polymeric cables.

In addition to the resources listed above in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRCJ2 Joint and maintain energised low voltage
4A underground paper insulated cables

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the jointing and maintenance of energised low voltage underground polymeric cables and covers the jointing, repair and replacement of cables using specialised live working equipment, tools and devices

Maintenance may include the repair and replacement of cables and associated hardware.

Underground equipment may include, ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations, LV switchboards, pillars/turrets, busbar/termination boxes, street lighting control gear and street lighting columns.

Test and recording equipment includes voltage detectors, tong ammeters, cable identification equipment, and insulation resistance testers.

Jointing and terminating materials include compound and resin filled boxes, polymeric tape materials, polymeric heat shrink materials, "slip-on" moulded components and pre-stretched polymeric materials, compression and mechanical connectors.

Jointing and terminating locations include, ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations, LV switchboards, pillars/turrets, busbar/termination boxes, street lighting control points and street lighting columns.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures

RANGE STATEMENT

- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Cable Jointing

UETTDRCJ29A Install gas and oil filled specialised underground cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation, jointing and termination of oil and gas filled specialised underground cables from 33kV and higher. It includes the laying of the specialised underground ground cable, the preparation of the cables and phasing out jointing and terminating and the preparation of the cable jointing bay. It also encompasses the relevant safety procedures to ensure installation of the specialised cable is undertaken according to established enterprise requirements.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice**3)**

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits

Prerequisite Unit(s)**4)**

UETTDRCJ21A	Lay ESI electrical cables
UETTDRCJ23A	Install and maintain de-energised high voltage underground paper insulated cables.
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
UETTDRCJ99A	Test and verify distribution cable jointing installations
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDREL16A	Working safely near live electrical apparatus
UETTDRI41A	Install network infrastructure electrical equipment
UETTDRI42A	Maintain network infrastructure electrical equipment
UETTDRI55A	Install and maintain low voltage underground services

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare/Plan to install oil and gas filled specialised underground cables	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.3	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
		1.4	Risk control measures are identified, prioritised and evaluated against the work schedule.
		1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept

ELEMENT	PERFORMANCE CRITERIA
	clear, to ensure safe systems of work are followed and according to established procedures.
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
	1.8 Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
	1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.12 Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements.
2 Carry out the installation of oil and gas filled specialised underground cables	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
	2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures.

ELEMENT	PERFORMANCE CRITERIA
	2.3 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.
	2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
	2.6 Installation of oil and gas filled specialised underground cables is carried out, in accordance with the work schedule and requirements and/or established procedures.
	2.7 Essential knowledge and associated skills are applied in the safe installation of oil and gas filled specialised underground cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
3 Complete the installation of oil and gas filled specialised underground cables	3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
	3.3 Work site is rehabilitated, cleaned up and

ELEMENT**PERFORMANCE CRITERIA**

- confirmed safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, underground cables are returned to service and advised to client/customer in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing oil and gas filled specialised underground cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ29A Oil and gas filled specialised underground cables

Evidence shall show an understanding of principles, installation and jointing/terminating of oil or gas filled specialised underground cables to an extent indicated by the following aspects:

T1 Oil and gas filled specialised underground cable principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the working with oil or gas filled specialised underground cables
- Types of oil or gas filled specialised underground cables - properties of paper insulation, oil and nitrogen gas, construction, reasons for gas and or oil filled, characteristics and capabilities of the cable, pressure/volume characteristics of oil and gas
- Precautions when handling
- Types and functions of tools and equipment used on oil or gas filled specialised underground cables
- Techniques when handling, storing and disposing of oil or gas filled specialised underground cables

T2 Installation of oil or gas filled specialised underground cables encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation of oil or gas filled specialised underground cables
- Safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures, Occupational Health and Safety hazards and precautions, dangers of working in confined spaces, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment including intrinsically safe equipment for use in confined and hazardous environments, Permit/Authorisation to work systems and isolation procedures, safe working policies, procedures and practices when using/operating specialised equipment, emergency response and rescue including First Aid etc
- Types, function and serviceability of tools and equipment used for the installation of oil or gas filled specialised underground cables
- Techniques in the safe installation of oil or gas filled specialised underground cables

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in the safe testing/inspection of the oil or gas filled specialised underground cables to ensure successful installation has occurred

T3 Jointing and terminating oil or gas filled specialised underground cables encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to jointing and terminating oil or gas filled specialised underground cables
- Safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures, Occupational Health and Safety hazards and precautions, dangers of working in confined spaces, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment including intrinsically safe equipment for use in confined and hazardous environments, Permit/Authorisation to work systems and isolation procedures, safe working policies, procedures and practices when using/operating specialised equipment, emergency response and rescue including First Aid etc
- Types, function and serviceability of tools and equipment used for the jointing and terminating of oil or gas filled specialised underground cables
- Techniques in the safe jointing and terminating oil or gas filled specialised underground cables
- Techniques in the safe testing of the oil or gas filled specialised underground cables to ensure successful jointing and/or termination has occurred

T4 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T5 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance

REQUIRED SKILLS AND KNOWLEDGE

including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures

- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T6 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is

recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and

range; and

- Apply sustainable energy principles and practices as specified in the performance criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Oil filled cables Gas filled cables
B	All of the following:	Specialised cable installation equipment Winches Caterpillars Rollers Bond lines Drum jacks Install cable end caps/nose pull assemblies
C	At least two of the following:	Straight through joint Straight stop joint Trifurcating joint

		Splitter joint Trifurcating/transition/s top
D	At least one of the following:	Box termination Gas filled termination Compound filled termination
E	At least two of the following:	Welded connectors Mechanical connectors Compression connectors
F	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation of oil and gas filled specialised underground cables.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment**9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units**9.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRCJ3 0A Maintain gas and oil filled specialised underground cables

UETTDRCJ3 1A Install and maintain polymeric specialised underground cables

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation of oil and gas filled specialised underground cables and may include the following:

Cable type includes: Pressurised oil filled and gas filled cables 33 kV and above.

Testing and recording equipment may include voltage detectors, cable identification equipment, insulation resistance testers.

Jointing and terminating materials: compound and resin filled boxes, paper tape/roll materials, polymeric tape materials, heat shrink materials, “slip on” moulded components, molten solders and gas/oil piping and fittings. compression, mechanical , solder lugs and ferrules and welded connections.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS

RANGE STATEMENT

- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Cable Jointing

UETTDRCJ30A Maintain gas and oil filled specialised underground cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance and repair of oil and gas filled specialised underground cables. It includes testing, diagnosing faults, repairing and replacing the specialised cables. It also encompasses the processes for preliminary pressure control and leak repair, as well as working under induced voltages, cable identification and cable freezing.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice**3)**

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits
UETTDRCJ21A	Lay ESI electrical cables

Prerequisite Unit(s)	4)	
	UETTDRCJ23A	Install and maintain de-energised high voltage underground paper insulated cables.
	UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
	UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
	UETTDRCJ29A	Install gas and oil filled specialised underground cables
	UETTDRCJ99A	Test and verify distribution cable jointing installations
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRLS41A	Install network infrastructure electrical equipment
	UETTDRLS42A	Maintain network infrastructure electrical equipment
	UETTDRLS55A	Install and maintain low voltage underground services

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare/Plan to maintain oil and gas filled specialised underground cables	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.
		1.2	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
		1.3	Risk control measures are identified, prioritised and evaluated against the work schedule.
		1.4	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.

ELEMENT**PERFORMANCE CRITERIA**

- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
- 1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
- 1.8 Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
- 1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.12 Positioning of road signs, barriers and warning devices is planned in accordance with requirements.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the maintenance of oil and gas filled specialised underground cables	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.</p> <p>2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures.</p> <p>2.3 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.</p> <p>2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.</p> <p>2.6 Maintenance of oil and gas filled specialised underground cables is carried out, in accordance with the work schedule and requirements and/or established procedures.</p> <p>2.7 Essential knowledge and associated skills are applied in the safe maintenance of oil and gas filled specialised underground cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.</p> <p>2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer</p>

ELEMENT**PERFORMANCE CRITERIA**

and to a community/industry standard.

- | | | | |
|---|---|-----|---|
| 3 | Complete the maintenance of oil and gas filled specialised underground cables | 3.1 | Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures. |
| | | 3.2 | Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures. |
| | | 3.3 | Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures. |
| | | 3.4 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
| | | 3.5 | Relevant work permit(s) are signed off and, underground cables are returned to service and advised to client/customer in accordance with requirements. |
| | | 3.6 | Works completion records, reports, as installed/modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining oil and gas filled specialised underground cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ30A Oil and gas filled specialised underground cables maintenance

Evidence shall show an understanding of maintenance of oil and gas filled specialised underground cables to an extent indicated by the following aspects:

T1 Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the maintenance of oil or gas filled specialised underground cables

T2 Safety precautions of working with oil or gas filled specialised underground cables encompassing:

- Safe operation procedures
- Occupational Health and Safety hazards and precautions
- Dangers of working in confined spaces
- Identification of OHS hazards, assessing and controlling risks
- Types, selection, maintenance, storage and uses of personnel protective equipment including intrinsically safe equipment for use in confined and hazardous environments
- Permit/Authorisation to work systems and isolation procedures
- Safe working policies, procedures and practices when using/operating specialised equipment
- Emergency response and rescue including First Aid etc

T3 Safe storage and disposal of oil or gas filled specialised underground cables and associated equipment and components; Types, function and serviceability of tools and equipment used for the maintenance of oil or gas filled specialised underground cables Techniques in the safe maintenance of oil or gas filled specialised underground cables

T4 Techniques in the safe testing/inspection of the oil or gas filled specialised underground cables to ensure successful maintenance has occurred

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	Oil filled cables Gas filled cables
B	At least two of the following:	Straight through joint Straight stop joint, Trifurcating joint Splitter joint Trifurcating/transition/s top joint
C	At least one of the following:	Air box terminator Gas filled terminator Compound filled terminator
D	At least two of the following:	Welded connectors Mechanical connectors Compression connectors
E	All of the following:	Voltage detectors Cable identification equipment and spiking Insulation resistance testers
F	All of the following:	Leak repair and pressure control cable freezing equipment Application of pressure control tapes Fittings and seals
G	All of the following:	Oil filled cables Gas filled cables
H	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to

		provide appropriate solutions incorporated in the holistic assessment with the above listed items
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of oil and gas filled specialised underground cables.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRCJ3 Install and maintain polymeric specialised
1A underground cables

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance and repair of oil and gas filled specialised underground cables and may include the following:

Cable type includes: Pressurised oil filled and gas filled cables 33 kV and above.

Testing and recording equipment may include voltage detectors, cable identification equipment, insulation resistance testers.

Jointing and terminating materials: compound and resin filled boxes, paper tape/roll materials, polymeric tape materials, heat shrink materials, “slip on” moulded components, molten solders and gas/oil piping and fittings. compression, mechanical, solder lugs and ferrules and welded connections.

This unit also encompasses the preparation for cable freezing and preliminary pressure control and leak repair activities.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards

RANGE STATEMENT

- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Cable Jointing

UETTDRCJ31A Install and maintain polymeric specialised underground cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation, maintenance and repair of polymeric specialised underground cables including XLPE and EPR above 33 kV. It includes jointing and terminating, as well as working under induced voltages and undertaking the relevant tests required for jointing. It also encompasses the preparation of the cable jointing bay, the preparation of cables and phasing out, cable identification and spiking, the treatment/handling of, but not jointing fibre optical cables.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice**3)**

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c.

Prerequisite Unit(s)	4)	Circuits
	UETTDRCJ21A	Lay ESI electrical cables
	UETTDRCJ23A	Install and maintain de-energised high voltage underground paper insulated cables.
	UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
	UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
	UETTDRCJ99A	Test and verify distribution cable jointing installations
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI41A	Install network infrastructure electrical equipment
	UETTDRI42A	Maintain network infrastructure electrical equipment
	UETTDRI55A	Install and maintain low voltage underground services

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare/Plan to install and maintain polymeric specialised underground cables	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.3	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.

ELEMENT**PERFORMANCE CRITERIA**

- 1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
- 1.5 Risk control measures are identified, prioritised and evaluated against the work schedule.
- 1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
- 1.8 Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
- 1.12 Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the installation and maintenance of polymeric specialised underground cables	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.</p> <p>2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures.</p> <p>2.3 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.</p> <p>2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.</p> <p>2.6 Installation and/or maintenance of polymeric specialised underground cables is carried out, in accordance with the work schedule and requirements and/or established procedures.</p> <p>2.7 Essential knowledge and associated skills are applied in the safe installation and/or maintenance of polymeric specialised underground cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.</p> <p>2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer</p>

ELEMENT**PERFORMANCE CRITERIA**

and to a community/industry standard.

- | | | | |
|---|---|-----|---|
| 3 | Complete the installation and maintenance of polymeric specialised underground cables | 3.1 | Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures. |
| | | 3.2 | Accidents and/or injuries are reported in accordance with requirements/established procedures. |
| | | 3.3 | Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures. |
| | | 3.4 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
| | | 3.5 | Relevant work permit(s) are signed off and, underground cables are returned to service and advised to client/customer in accordance with requirements. |
| | | 3.6 | Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining polymeric specialised underground cables

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ31A Polymeric specialised underground cables

Evidence shall show an understanding of principles, installation and maintenance and jointing of polymeric specialised underground cables to an extent indicated by the following aspects:

T1 Polymeric specialised underground cables principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the working with polymeric specialised underground cables
- Types of polymeric specialised underground cables – construction, characteristics and capabilities of the polymeric specialised cable, pressure/volume characteristics of oil and gas, precautions when handling
- Types and functions of tools and equipment used on polymeric specialised underground cables
- Techniques when handling polymeric specialised underground cables

T2 Installation and maintenance of polymeric specialised underground cables encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and maintenance of polymeric specialised underground cables
- Safety precautions of working with polymeric specialised underground cables - safe operation procedures, Occupational Health and Safety hazards and precautions, dangers of working in confined spaces, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment, authorisation to work systems and isolation procedures, safe working policies, procedures and practices when using/operating specialised equipment, emergency response and rescue including First Aid etc
- Types, function and serviceability of tools and equipment used for the installation of polymeric specialised underground cables
- Techniques in the safe installation of polymeric specialised underground cables
- Techniques in the safe maintenance of polymeric specialised underground cables
- Techniques in the safe testing/inspection of the polymeric specialised underground cables to ensure successful installation and/or maintenance has occurred

REQUIRED SKILLS AND KNOWLEDGE

T3 Jointing and termination of polymeric specialised underground cables encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the working with polymeric specialised underground cables
- Safety precautions of working with polymeric specialised underground cables - safe operation procedures, Occupational Health and Safety hazards and precautions, dangers of working in confined spaces, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment, authorisation to work systems and isolation procedures, safe working policies, procedures and practices when using/operating specialised equipment, emergency response and rescue including First Aid etc
- Types, function and serviceability of tools and equipment used for the jointing and terminating of polymeric specialised underground cables
- Techniques in the safe jointing and terminating polymeric specialised underground cables
- Techniques in the safe testing of the polymeric specialised underground cables to ensure successful jointing and/or termination has occurred

T4 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T5 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol

REQUIRED SKILLS AND KNOWLEDGE

- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T6 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge

and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and

- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Install and maintain at least one of the following:	Specialised XLPE cables above 33 kV Specialised EPR cables above 33 kV
B	All of the following:	Straight through joints. Terminations
C	Use of at least three of the following specialised cable installation equipment:	Winches Caterpillars Rollers Bond lines Nose pull devices Drum jacks
D	At least two of the following:	Connectors Mechanical connectors Compression connectors
E	At least two of the following:	Air boxes Compound filled boxes

		Gas filled boxes
F	At least two of the following:	Polymeric tape materials Heat shrink materials Moulded components
G	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of polymeric specialised underground cables.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is

expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRCJ2 9A Install gas and oil filled specialised underground cables

UETTDRCJ3 0A Maintain gas and oil filled specialised underground cables

UETTDRCJ3 2A Install and maintain gas and oil pressure systems for specialised underground cables

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to polymeric specialised underground cables including XLPE and EPR above 33 kV, and covers the installation, jointing, terminating, repair and replacement of cables used in systems and circuits and the issuing/accepting of relevant permits.

It also encompasses the preparation of the cable jointing bay, the preparation of cables and phasing out, the treatment/handling, but not jointing of fibre optical cables. Also cable identification and spiking are included.

Underground equipment may include switchgear, transformers, specialised cable joints and termination kits, specialised cable installation equipment, specialised cable heating equipment and tooling.

Test and recording equipment includes voltage detectors, cable identification equipment, cable spiking equipment and insulation resistance testers.

Jointing and terminating materials include compound and resin filled boxes, polymeric tape materials, polymeric heat shrink materials, "slip-on" moulded components and pre-stretched polymeric materials, welded, compression and Mechanical connectors.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures

RANGE STATEMENT

- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Cable Jointing

UETTDRCJ32A Install and maintain gas and oil pressure systems for specialised underground cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation, maintenance and repair of oil and gas pressure systems for specialised underground cables. It includes the undertaking of pressure control activities, the installation of gauges, oil tanks and gas cubicles. It also includes the knowledge of Oil Route Profiles as well as the operation of pressure equipment for jointing works, and the repairing and replacing of pressure systems. It also encompasses the procedures associated with performing accessory impregnation, oil flow testing, the processes for oil degasification and performing leak location of pressure systems.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place

License to practice

3)

subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEED101A	Solve problems in electromagnetic

Prerequisite Unit(s)	4)	devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDRCJ21A	Lay ESI electrical cables
	UETTDRCJ23A	Install and maintain de-energised high voltage underground paper insulated cables.
	UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
	UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
	UETTDRCJ99A	Test and verify distribution cable jointing installations
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI41A	Install network infrastructure electrical equipment
	UETTDRI42A	Maintain network infrastructure electrical equipment
	UETTDRI55A	Install and maintain low voltage underground services

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the

following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|---|---|
| 1 Prepare/Plan to install and maintain oil and gas pressure systems for specialised underground cables | 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination. |
| | 1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures. |
| | 1.3 Risk control measures are identified, prioritised |

ELEMENT

PERFORMANCE CRITERIA

and evaluated against the work schedule.

- 1.4 Relevant requirements and established procedures for the work are to all personnel and identified for all work sites.
- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
- 1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
- 1.8 Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
- 1.12 Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the installation and maintenance of oil and gas pressure systems for specialised underground cables	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
	2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures.
	2.3 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.
	2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
	2.6 Installation and/or maintenance of oil and gas pressure systems for specialised underground cables is carried out, in accordance with the work schedule and requirements and/or established procedures.
	2.7 Essential knowledge and associated skills are applied in the safe installation and/or maintenance of oil and gas pressure systems for specialised underground cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and

ELEMENT

PERFORMANCE CRITERIA

- to a community/industry standard.
- 3 Complete the installation and maintenance of oil and gas pressure systems for specialised underground cables
- 3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
- 3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
- 3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, underground cables are returned to service and advised to client/customer in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining oil & gas pressure systems for specialised underground cables

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ32A Oil and gas specialised underground cables pressure systems

Evidence shall show an understanding of principles, installation and maintenance and jointing of polymeric specialised underground cables pressure systems to an extent indicated by the following aspects:

T1 Oil or gas filled specialised underground cables encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the working with oil or gas filled specialised underground cables
- Types of oil or gas filled specialised underground cables - properties of paper insulation, oil and nitrogen gas, construction, reasons for gas and or oil filled, characteristics and capabilities of the cable, pressure/volume characteristics of oil and gas, precautions when handling
- Types and functions of tools and equipment used on oil or gas filled specialised underground cables
- Techniques when handling, storing and disposing of oil or gas filled specialised underground cables

T2 Installation of oil or gas filled specialised underground cables encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation of oil or gas filled specialised underground cables
- Safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures, Occupational Health and Safety hazards and precautions, dangers of working in confined spaces, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment including intrinsically safe equipment for use in confined and hazardous environments, Permit/Authorisation to work systems and isolation procedures, safe working policies, procedures and practices when using/operating specialised equipment, emergency response and rescue including First Aid etc
- Types, function and serviceability of tools and equipment used for the installation of oil or gas filled specialised underground cables
- Techniques in the safe installation of oil or gas filled specialised underground cables
- Techniques in the safe testing/inspection of the oil or gas filled specialised

REQUIRED SKILLS AND KNOWLEDGE

underground cables to ensure successful installation has occurred

T3 Jointing and termination of oil or gas filled specialised underground cables encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the working with oil or gas filled specialised underground cables
- Safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures, Occupational Health and Safety hazards and precautions, dangers of working in confined spaces, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment including intrinsically safe equipment for use in confined and hazardous environments, Permit/Authorisation to work systems and isolation procedures, safe working policies, procedures and practices when using/operating specialised equipment, emergency response and rescue including First Aid etc
- Types, function and serviceability of tools and equipment used for the jointing and terminating of oil or gas filled specialised underground cables
- Techniques in the safe jointing and terminating oil or gas filled specialised underground cables
- Techniques in the safe testing of the oil or gas filled specialised underground cables to ensure successful jointing and/or termination has occurred

T4 Maintenance of oil or gas filled specialised underground cables encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the maintenance of oil or gas filled specialised underground cables
- Safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures, Occupational Health and Safety hazards and precautions, dangers of working in confined spaces, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment including intrinsically safe equipment for use in confined and hazardous environments, Permit/Authorisation to work systems and isolation procedures, safe working policies, procedures and practices when using/operating specialised equipment, emergency response and rescue including First Aid etc
- Safe storage and disposal of oil or gas filled specialised underground cables and associated equipment and components;
- Types, function and serviceability of tools and equipment used for the maintenance of oil or gas filled specialised underground cables
- Techniques in the safe maintenance of oil or gas filled specialised underground cables
- Techniques in the safe testing/inspection of the oil or gas filled specialised underground cables to ensure successful maintenance has occurred

T5 Oil and gas pressurised systems for specialised underground cables

REQUIRED SKILLS AND KNOWLEDGE

encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and maintenance of oil and gas pressurised systems
- Safe storage and disposal of oil or gas pressurised equipment and associated components;
- Requirements for the use of manuals, system diagrams/plans, drawings, charts and layouts
- Characteristics, application and care of hand and specialised tools
- Techniques in determining route profiles and access locations
- Pressure system characteristics for oil filled and gas filled cables
- Techniques in the safe installation of oil and gas pressurised systems
- Techniques in the safe maintenance of oil and gas pressurised systems
- Techniques in the safe use of tools and equipment in the process of installation and maintenance of oil and gas pressurised systems - gas analyser/detector, manometers, flow boards, cable freezing equipment, accessory impregnation equipment, oil degasification plant, manometers, flowboards, vacuum pumps, site bottles, gas cylinders, pressure/vacuum meters, oil evacuation pumps, RGP equipment, oil sampling equipment, gas control cubicles, oil control cubicles, cable joints and terminations, oil degasification units and oil pressure tanks

T6 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T7 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures

REQUIRED SKILLS AND KNOWLEDGE

- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T8 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord

with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as

- specified in the performance criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Oil filled pressure systems Gas filled pressure systems
B	All of the following:	Gas analyser/detector Manometers Flow boards Cable freezing equipment
C	All of the following:	Accessory impregnation equipment Oil degasification plant Manometers Flowboards Vacuum pumps Site bottles

		Gas cylinders Pressure/vacuum meters Oil evacuation pumps RGP equipment Oil sampling equipment
D	All of the following:	Gas control cubicles Oil control cubicles Cable joints and terminations Oil degasification units Oil pressure tanks
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of oil and gas pressure systems for specialised underground cables.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction

types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRCJ2 9A Install gas and oil filled specialised underground cables

UETTDRCJ3 1A Install and maintain polymeric specialised underground cables

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of oil and gas pressure systems for specialised underground cables. It covers the installation of pressure control cubicles, pressure lines, oil and gas tanks/cylinders and flow control equipment. Maintenance of pressure systems including routine maintenance activities and equipment testing. Leak location activities including cable freezing and flow rate comparison tests.

It also encompasses the processing of cable oil and basic testing and sampling of oil.

Oil processing and control equipment may include: Oil de-gasification units, oil trays and pumps, vacuum pumps, accessory impregnation equipment, RGP meters & equipment, manometers, vacuum meters, flow boards, oil sampling flasks and extraction plant, liquid nitrogen cylinders and associated cable freezing equipment, oil pressure tanks, oil piping, fittings and valves, oil control cubicles

Gas processing & control equipment may include: Dry nitrogen cylinders, gas piping, fittings and valves, pressure meters and transducers, gas control cubicles.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards

RANGE STATEMENT

- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
Cable Jointing

UETTDRCJ33A Install and maintain network infrastructure LV underground cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of de-energised low voltage underground cables and covers the laying of cables as well as the jointing, terminating, repair and replacement of cables. It could include direct laying of cables in trenches, on racks, in troughs and/or in conduit or ducts and also includes the isolation of systems and circuits, the procedure of issuing/accepting electrical access permits, the undertaking of pre-commissioning and/or re-commissioning tests and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice

3)

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with

Prerequisite Unit(s)	4)	electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDREL16A	Working safely near live electrical

Prerequisite Unit(s) 4)

apparatus

- UETTDNIS46A Install and maintain ESI network infrastructure electrical equipment
- UETTDNIS62A Implement and monitor the power system organisational OHS policies, procedures and programs
- UETTDNIS63A Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the laying, installation and maintenance of underground cables	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the laying, installing and maintenance of LV underground cables are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p>

ELEMENT	PERFORMANCE CRITERIA
1.8	Relevant personnel at work site are confirmed current in First Aid and other related work procedures according to requirements.
1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
1.12	Road signs, barriers and warning devices are positioned in accordance with requirements.
2 Carry out the laying, installation and maintenance of LV underground cables	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working in confined spaces and working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.
	2.4 Essential knowledge and associated skills are applied for the safe installation and maintenance of LV underground cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.5 Electrical cables are laid in accordance with the

ELEMENT	PERFORMANCE CRITERIA
	work schedule and requirements/established procedures.
2.6	De-energised LV underground cables are installed according to the work schedule and requirements/established procedures.
2.7	Maintenance, including repair and/or replacement of de-energised LV underground cables is carried out, in accordance with the work schedule and requirements/established procedures.
2.8	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
2.9	Unplanned events in the laying, installing and carrying out the maintenance of LV underground cables are undertaken within the scope of established procedures.
2.10	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
2.11	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the laying, installation and maintenance of LV underground cables	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.

ELEMENT

PERFORMANCE CRITERIA

- 3.5 Relevant work permit(s) are signed off and LV underground cables are returned to service in accordance with requirements
- 3.6 Works completion records, reports, drawings and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of laying, installing and maintaining LV underground cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ33A Network infrastructure LV underground cables

Evidence shall show an understanding of installation and maintenance of network infrastructure LV underground cables to an extent indicated by the following aspects:

T1 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T2 Substations, power transformers and reactors encompassing:

- Relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
- Characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling
- Auxiliary equipment used on transformers - function and basic operation of equipment
- Maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault finding procedures
- Description, purpose and characteristics of a reactors

T3 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker

REQUIRED SKILLS AND KNOWLEDGE

- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker's body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair
- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work

T4 Procedure in providing store support encompassing:

- Classification and identification of equipment, components and tools
- Procedures for purchasing/ordering items, removing/dispatching items, stocktaking, security, bookkeeping/record keeping
- Material handling - warehouse/depot storage techniques, handling equipment, pallet lift trucks, forklifts
- Cable drum handling equipment
- Safety procedures - storage and care of safety equipment, handling hazardous materials, storage of hazardous substances and dangerous goods, depot safety procedures, manufacturers and suppliers information including material safety data sheets (MSDS)

T5 Installation of underground cable encompassing:

- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Safety precautions specific to the installation of underground cable - excavation and trench safety regulations, gas detection procedures, working in confined spaces, personal protective equipment, hazards for the use of LPG equipment for

REQUIRED SKILLS AND KNOWLEDGE

jointing of underground cable, gas bottle testing procedures, permit to work systems and isolation procedures.

- Trench excavation and reinstatement procedures
- Installation of underground cable procedures - types of tools and equipment, methods of installing conduits, methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)
- Procedures for the safe use of LPG equipment for cable jointing

T6 LV polymeric cable jointing principles encompassing:

- Techniques in jointing LV XLPE cables - straight through joint, jointing different types of cable and service and street light cable joints
- Techniques in terminating LV XLPE - pole top terminations, substation terminations, distribution pillar /column/cubicle terminations and service and street light cable terminations
- Techniques in repairing LV XLPE cable - different types of damage, repairs to sheath, repairs to cores
- Methods of testing cable after jointing

T7 Jointing and termination of LV polymeric cable encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the jointing of LV polymeric cables
- Types of cables - single core, multi core and XLPE insulation
- Methods of cable handling - direct laid cables, duct laid cables, solid laid cables, cables supported in cleats or hangers
- Corrosion protection
- Minimum bending radius of cables
- Methods of cable sealing - shorting of cables cores, core of un-terminated cables
- Methods of protection from corrosion
- Polymeric sheathed cables sealing with mastic lined
- Heat shrink caps buried sealed ends
- Types of jointing tools - general hand tools, compression tools
- Techniques in the use of LPG - safety precautions, personal protective equipment, general maintenance and repair
- Safety precautions when cable jointing -working in confined spaces, permit to work systems and isolation procedures and emergency rescue/response including First Aid

T8 Underground cables construction and types encompassing:

- Safety precautions specific to handling underground cables
- Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- Types and applications of UC
- Construction types and structures of underground cables
- Characteristics of different types of underground cables

REQUIRED SKILLS AND KNOWLEDGE

- Ratings

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safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

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 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Laying at least one of the following:	LV polymeric LV paper insulated
B	With regards to "A" incorporate at least one of the following:	Direct lay On racks In conduits
C	With regards to "A" incorporate at least one cable pulling methods of the following:	Stocking pulling Bond pulling Armour pulling Nose pull attachments
D	With regards to "A" incorporate at least two cable sealing methods of the following:	Heat shrinkable Pre-stretched materials Tin/lead wiping Pre-moulded components
E	At least one cable cutting methods of the following:	Hydraulic cutters Electric reciprocating Motorised Hand tools
F	With regards to "A" incorporate at least four of the following:	Drum jacks Winches Spindles Capstans Bollards Cable trailers Rollers Lubricants

		Ropes Bell mouths Draw wires/rods
G	Installation and maintenance of all of the following:	LV polymeric cable
H	With regards to "G" incorporate at two of the following:	Tee-off joints Straight through joints Parallel branch joints Parallel joints
I	With regards to "G" incorporate at least one of the following:	Transformers, LV switchboards Pillars/turrets Lighting columns Ring main units Chamber substations
J	With regards to "G" incorporate at least two of the following:	Busbar/termination boxes Links/Fuses Disconnect boxes Termination boxes Control gear UG/OH terminations Circuit breakers
K	With regards to "G" incorporate at least one of the following:	Resin filled boxes, Compound filled boxes Polymeric tape Heat shrink Slip-on' moulds Pre-stretched polymeric
L	With regards to "G" incorporate at least one of the following:	Compression lugs Welded connections

		Mechanical connectors Insulation piercing connectors
M	With regards to the above incorporate all of the following:	Insulation resistance testers Voltage detectors
N	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance network infrastructure low voltage underground cables.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRCJ3 Install and maintain network infrastructure HV
4A underground cables

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of de-energised low voltage underground polymeric cables and covers the laying, jointing, terminating, repair and replacement of cables used in systems and circuits and the issuing/accepting of relevant permits. It includes the laying of ducts and/or conduit for electrical cables.

The unit includes the laying of cables direct in trenches, on racks, in troughs and /or in conduit or ducts.

It also encompasses cable pulling methods, pulling tensions, minimum bending radii, reduction of frictional forces, use of supporting plant (e.g. dynamometers, rigging, winches, etc), working on FRC, PVC, A/C ducted systems and the cutting and sealing of cables.

Test and recording equipment may include voltage detectors, tong ammeters, cable identification equipment, and insulation resistance testers.

Jointing and terminating materials may include compound and resin filled boxes, polymeric tape materials, polymeric heat shrink materials, "slip-on" moulded components and pre-stretched polymeric materials, compression, welded and mechanical connectors.

Jointing and terminating equipment and locations may include links, fuses, disconnect boxes, ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations, LV switchboards, pillars/turrets, busbar/termination boxes, street lighting control points and street lighting columns.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications

RANGE STATEMENT

- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.
- Testing procedures
- Work clearance systems.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Cable Jointing

UETTDRCJ34A Install and maintain network infrastructure HV underground cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of de-energised high voltage underground cables and covers the laying of cables as well as the jointing, terminating, repair and replacement of cables. It could include direct laying of cables in trenches, on racks, in troughs and /or in conduit or ducts and also includes the isolation of systems and circuits, the procedure of issuing/accepting electrical access permits, the undertaking of pre-commissioning and/or re-commissioning tests and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice

3)

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with

Prerequisite Unit(s)	4)	
		electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDRCJ33A	Install and maintain network infrastructure LV underground cables
	UETTDREL16A	Working safely near live electrical

Prerequisite Unit(s) 4)

apparatus

UETTDRIS46A Install and maintain ESI network infrastructure electrical equipment

UETTDRIS62A Implement and monitor the power system organisational OHS policies, procedures and programs

UETTDRIS63A Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to the laying, installation and maintenance of de-energised HV underground cables	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the laying, installing and maintenance of HV underground cables are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p>

ELEMENT

PERFORMANCE CRITERIA

- 1.8 Relevant personnel at work site are confirmed current in First Aid and other related work procedures according to requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.
- 2 Carry out the laying, installation and maintenance of HV underground cables
 - 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
 - 2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
 - 2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.
 - 2.4 Essential knowledge and associated skills are applied in the safe installation and maintenance of HV underground polymeric cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.

ELEMENT

PERFORMANCE CRITERIA

- 2.5 Electrical cables are laid in accordance with the work schedule and requirements/established procedures.
- 2.6 De-energised HV underground cables are installed according the work schedule and requirements/established procedures.
- 2.7 Maintenance, including repair and/or replacement of de-energised HV underground cables is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.8 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.9 Unplanned events in the installation and maintenance of HV underground cables are undertaken within the scope of established procedures.
- 2.10 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.11 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 3 Complete the laying, installation and maintenance of HV underground cables
 - 3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
 - 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
 - 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
 - 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance

ELEMENT

PERFORMANCE CRITERIA

with established procedures.

- 3.5 Relevant work permit(s) are signed off and, HV underground cables are returned to service in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining de-energised HV underground polymeric cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ34A Network infrastructure HV polymeric underground cables

Evidence shall show an understanding of the jointing and termination of network infrastructure HV polymeric cables to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the jointing of HV underground polymeric cables

T2 Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, encompassing:

- Characteristics of different types of cables and components
- Purpose of stress control
- Applications of various tools and equipment for HV jointing

T3 Procedure for isolating high voltage underground cables encompassing:

- Method for proving safe to work
- Earthing procedures

T4 Techniques in jointing HV underground polymeric cable, encompassing:

- Short circuit cores and seal cable
- Straight through
- Trifurcating

T5 Techniques in HV terminations encompassing:

- Pole top termination
- Substation/switchgear termination
- ABC termination
- Telcon termination

T6 Procedures for repairing HV underground cables encompassing:

- Location of faults
- Types of damage
- Techniques to repairs to sheath
- Techniques to repairs to core

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Laying at least one of the following;	HV polymeric HV paper insulated
B	With regards to "A" incorporate at least one of the following:	Direct lay On racks In conduits
C	With regards to "A" incorporate at least one cable pulling methods of the following:	Stocking pulling Bond pulling Armour pulling Nose pull attachments
D	With regards to "A" incorporate at least two cable sealing methods of the following:	Heat shrinkable Pre-stretched materials Tin/lead wiping Pre-moulded components
E	With regards to "A" incorporate at least one cable cutting methods of the following:	Hydraulic cutters Electric reciprocating Motorised Hand tools
F	With regards to "A" incorporate at least four of the following:	Drum jacks Winches Spindles Capstans Bollards Cable trailers Rollers Lubricants Ropes Bell mouths Draw wires/rods
G	Install and maintain all of the following:	HV polymeric cables

H	With regards to "G" incorporate at least two of the following:	Tee-off joints Straight through joint Parallel branch joint Parallel joint
I	With regards to "G" incorporate at least one of the following:	Transformers Ring main units Chamber substations
J	With regards to "G" incorporate at least one of the following:	Busbar/termination boxes Links/Fuses Termination boxes Control gear Circuit breakers
K	With regards to "G" incorporate at least two of the following:	Resin filled boxes Compound filled boxes Polymeric tape Heat shrink 'slip-on' moulds Pre-stretched polymeric
L	With regards to the above incorporate at all of the following:	Insulation resistance testers Voltage detectors
M	With regards to the above incorporate all of the following;	Cable identification devices Cable spiking devices
N	With regards to "G" incorporate at least two of the following:	Mechanical connectors Compression connectors Lugs
O	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and

		associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of network infrastructure HV underground cables.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRCJ3 3A Install and maintain network infrastructure LV underground cables

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of de-energised high voltage underground polymeric cables and covers the jointing, terminating, repair and replacement of cables used in systems and circuits and the issuing/accepting of relevant permits.

Underground equipment may include links, fuses, ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations and busbar/termination boxes.

The unit includes the laying of cables direct in trenches, on racks, in troughs and /or in conduit or ducts.

It also encompasses cable pulling methods, pulling tensions, minimum bending radii, reduction of frictional forces, use of supporting plant (e.g. dynamometers, rigging, winches, etc), working on FRC, PVC, A/C ducted systems and the cutting and sealing of cables.

Test and recording equipment includes voltage detectors, cable identification equipment, cable spiking equipment and insulation resistance testers.

Jointing and terminating materials include compound and resin filled boxes, polymeric tape materials, polymeric heat shrink materials, "slip-on" moulded components and pre-stretched polymeric materials, compression and mechanical connectors

Jointing and terminating locations include circuit breakers, links, fuses, , ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations and busbar/termination boxes.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.

RANGE STATEMENT

- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Cable Jointing

UETTDRCJ99A Test and verify distribution cable jointing installations

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of de-energised high voltage and low voltage underground polymeric cables and includes underground services, network infrastructure, the jointing, terminating and repair of cables. It encompasses working safely, visual inspections and mandatory and functional test procedures, identifying non-compliance defects and mandatory reporting requirements

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice**3)**

safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, state/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment

Note:

1. Compliance and currency of permits may be required in various jurisdictions and typically relate to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working at heights, near live electrical apparatus, first aid, lifting and site rehabilitation.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits

Prerequisite Unit(s)	4)	
	UEENEEE105A	Fix and secure electrotechnology equipment
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDRCJ21A	Lay ESI electrical cables
	UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
	UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRLS41A	Install network infrastructure electrical equipment
	UETTDRLS42A	Maintain network infrastructure electrical equipment
	UETTDRLS55A	Install and maintain low voltage underground services

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the

following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for jointing LV and HV underground polymeric cables and LV services	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 OHS policies and procedures related to requirements and established procedures for the installation of electrical equipment (network infrastructure) are obtained and confirmed for the purposes of the work to be performed and

ELEMENT**PERFORMANCE CRITERIA**

- communicated.
- 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
 - 1.5 Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
 - 1.6. Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
 - 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
 - 1.8 Relevant personnel at worksite are confirmed current in First Aid and other related work procedures according to requirements.
 - 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
 - 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
 - 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
 - 1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the jointing LV and HV underground polymeric cables and LV services	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely operated near energised and exposed electrical conductors/apparatus according to requirements and procedures.
	2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.
	2.4 Essential knowledge and associated skills are applied in the inspection, safe access, testing and verification of low voltage and high voltage underground polymeric cables to ensure completion in an agreed time frame and to quality standards with minimum of waste according to requirements.
	2.5 Low voltage and high voltage underground polymeric cables and associated equipment are installed, terminated/connected according to the work schedule and requirements/established procedures.
	2.6 Maintenance, including repair and/or replacement of low voltage and high voltage underground polymeric cables is carried out, in accordance with the work schedule and requirements / established procedures.
	2.7 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.8 Underground cable installations and associated hardware are visually inspected and confirmed as positioned, secured and terminated/connected

ELEMENT	PERFORMANCE CRITERIA
	in accordance with requirements and established procedures.
	2.9 Tests and/or measurements to verify cable jointing installations are determined and conducted in strict accordance with OHS requirements and within established safety procedures.
	2.10 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.11 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete jointing LV and HV underground polymeric cables and LV services	3.1 Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and cables are returned to service in accordance with requirements.
	3.6 Works completion records, reports, drawings and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential knowledge and associated skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of laying electrical cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TCJ99A Test and verify distribution cable jointing installations

Evidence shall show knowledge and skills of cable jointing to an extent indicated by the following aspects:

T1 Legislated regulations encompassing:

- legislation and regulations that require distribution cable jointing installations and equipment to be tested to ensure they are safe.
- the person/bodies responsible for the various aspects of ensuring distribution cable jointing installations are safe.
- results of tests that show a distribution cable jointing installation is safe for connection to the supply.
- results of periodic inspection and tests that show wiring and equipment is safe to use.
- results of periodic inspection and tests that show the distribution cable jointing installations electrical equipment is safe to use.

T2 Testing installations encompassing:

- Distribution cable jointing system phasing, phase rotation and polarity is correct and conforms to network construction standards
- Installation resistance is adequate
- Cable identification

T3 Documentation encompassing:

- results of tests conducted on a distribution cable jointing installation in accordance with work package requirements and ensure the distribution cable jointing installation is safe.
- documents of periodic inspection and testing of distribution cable jointing installation and equipment in accordance with requirements.

T4 Techniques in the installation and maintenance of network infrastructure

T5 Techniques in jointing, terminating and maintenance encompassing:

- high voltage polymeric cables
- low voltage polymeric cables
- underground services

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships.

However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment

Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum	Item List

	number of items on which skill is to be demonstrated	
A	All of the following:	LV polymeric cables HV polymeric cables
B	Any two of the following:	Tee-off joints Straight through joints Parallel branch joints Parallel joints Trifurcating joint
C	At least two of the following:	Pillars (single phase) Pillars (three phase) Lighting pillar standards LV switchboards Substations UGOH terminations
D	At least one of the following:	Transformers Switchgear Ring main units
E	At least one of the following:	Resin filled boxes Compound filled boxes Polymeric tape Heat shrink Slip-on moulds
F	At least one of the following:	Compression lugs Mechanical connectors Insulation piercing connectors Lugs
G	At least four of the following	Polarity test* Phase rotation test Continuity test

		Voltage test Insulation resistance test (*must do)
H	All of the following	Cable ID devices Cable spiking devices

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Network construction standards
- Network supply standards
- Suitable work environment, facilities, equipment and materials to undertake actual installation, maintenance, testing and verification on de-energised low voltage underground polymeric cables.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in the installation and maintenance of de-energised high voltage and low voltage underground polymeric cables and includes underground services, network infrastructure, the jointing, terminating and repair of cables. It encompasses working safely, visual inspections and mandatory and functional test procedures, identifying non-compliance defects and mandatory reporting requirements

Test and recording equipment may include digital/analogue voltage detectors, multimeters, phase rotation testers, load testers, continuity testers, tong ammeters, cable identification and spiking equipment and insulation resistance testers.

Testing procedures may include continuity, polarity, phase rotation, insulation resistance and voltage.

Installation may include, the laying and connection of cables, connection of the cable to underground equipment, the fitting and connection of fuses or circuit breakers and the testing and commissioning of the cable.

Maintenance may include the removal, repair and replacement of electrical equipment encompassing “like for like” and associated hardware as well as the termination and/or connection of this equipment according to requirements and the temporary installation of services and associated equipment. It also encompasses the identification of faults; the pre-commissioning tests involving the equipment/system and the interpretation of these tests against agreed specifications.

Service includes the connection between the customers’ point of supply and the underground pillar/pit connection (single phase), underground pillar/pit connection (three phase) and or underground to overhead connection.

Electrical equipment and associated hardware may include relevant transmission or distribution network; switchgear (e.g. reclosers, sectionalisers, drop-out fuses, disconnectors, isolators, air break switches, gas filled switches, fuse switches); transformers (e.g. padmount, pole-mounted and mobile); reactors; fault indicators; regulators;; capacitors; relays (simple); mobile generators and surge arrestors; support brackets and the like.

Jointing and terminating equipment and locations may include circuit breakers, contactors, mains connection boxes, links, fuses, disconnect boxes, ring main units, distribution fuse boxes, pad mount and ground transformers, chamber substations, LV switchboards, pillars/turrets, busbar/termination boxes, street lighting control points and street lighting columns.

RANGE STATEMENT

Jointing and terminating materials may include compound and resin filled boxes, polymeric tape materials, polymeric heat shrink materials, "slip-on" moulded components and pre-stretched polymeric materials, compression, welded and mechanical connectors.

It does not include the energisation of equipment in a highly complex, interdependent and interconnected electricity supply network system, where the effects of unintended consequences on the system are high risk and appropriate personnel effect energisation.

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Cable Jointing

UETTDRDP11A Inspect overhead poles-structures and electrical apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the inspection as per requirements of overhead structures such as poles and/or other structures other than towers. It also includes inspection of electrical apparatus such as, overhead conductors and or cables, underground and overhead transition points, electrical equipment, such as pole-mounted transformers, switchgear, hardware and or earthing systems. It encompasses the completion of inspection reports and other relevant documentation in accordance with requirements.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice**3)**

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the

following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the inspection of overhead structures and electrical apparatus used on poles and/or structures	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 OHS policies and procedures related to requirements and established procedures for the inspection of overhead structures and electrical apparatus used on poles and/or structures are obtained and confirmed for the purposes of the

ELEMENT**PERFORMANCE CRITERIA**

- work to be performed and communicated.
- 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
 - 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
 - 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
 - 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
 - 1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
 - 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
 - 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
 - 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
 - 1.12 Traffic management plan is identified and implemented.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out inspection of overhead structures and electrical apparatus used on poles and/or structures	2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Essential knowledge and associated skills are applied in the safe inspection of overhead structures and electrical apparatus used on poles and/or structures to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.4 Inspection of overhead structures and electrical apparatus used on poles and/or structures is carried out, in accordance with the work schedule and requirements/established procedures.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6 Unplanned events during the inspection of overhead structures and electrical apparatus used on poles and/or structures are undertaken within the scope of established procedures.
	2.7 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.8 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the inspection of overhead structures and electrical apparatus used on poles and/or structures	<p>3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.</p> <p>3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.</p> <p>3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.</p> <p>3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures.</p> <p>3.5 Relevant work permit(s) are signed off and, overhead structures and electrical apparatus used on poles and/or structures are returned to service in accordance with requirements.</p> <p>3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of inspecting overhead structures and electrical apparatus (poles /structures).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDP11A Inspection of distribution assets

Evidence shall show an understanding of the inspection of poles and overhead lines to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements

T2 Characteristics of wood used for structures within the electrical distribution system encompassing:

- Relationship between timber and water
- Faults that occur that influence the integrity of the structure
- Affects of fungal activity
- Affects of termite and borer activity
- Affects of dry rot

T3 Deterioration of assets encompassing:

- Relationship between steel, concrete and wood
- Deterioration in steel and concrete
- Inspection procedures for deterioration

T4 Overhead line inspection procedures of electrical distribution structures encompassing:

- Methods and requirements for overhead line inspection on electrical distribution structures
- Clearances for overhead conductors, cables and structures
- Use of specific equipment during inspection
- Methods of recording data

T5 Underground cable inspection procedures in the electrical distribution system encompassing:

- State industry policy and regulations
- Methods and requirements for inspection on underground cable terminations

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Any three of the following:	Poles and structures Overhead conductors/cables Underground/overhead transition points Electrical equipment Hardware Earthing systems
B	At least one of the following:	Ground Vehicle Helicopter Fixed wing
C	At least two of the following:	Visual* Infra-red camera X-ray Camera (*must Do)
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.

- Suitable work environment, facilities, equipment and materials to undertake actual inspection of overhead structures and electrical apparatus.

In addition to the resources listed above in, context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment**9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units**9.5)**

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the inspection of overhead structures such as poles and/or other structures other than towers and electrical apparatus and equipment.

Inspection may be carried out on foot, and/or by conventional ground-based vehicle, or from the air. Aircraft may be helicopters or fixed-wing types.

Inspection techniques include use of X-ray and infrared camera.

Items to be inspected may include overhead poles and or structures, but not towers.

Types of electrical apparatus to be inspected include overhead conductors and cables, underground cables and overhead transition points and, electrical equipment such as pole-mounted transformers and air-break switches, hardware, such as insulators, surge arrestors and cross-arms and or earthing systems.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Rang Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation

RANGE STATEMENT

- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel.
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Distribution

UETTDRDP12A Maintain overhead energised low voltage conductors and cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of overhead energised low voltage conductors and cables and includes the verification of the site conditions and the potential hazards. It also encompasses the selection of appropriate and authorised work method using specialised equipment, the diagnosis of faults, the undertaking of electrical tests and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits
UETTDREL11A	Apply sustainable energy and

Prerequisite Unit(s)	4)	environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDNIS52A	Install and maintain poles, structures and associated hardware
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|---|-----|---|
| 1 | Prepare for the maintenance of overhead energised LV conductors and cables. | 1.1 | Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection. |
| | | 1.2 | Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites. |
| | | 1.3 | OHS policies and procedures related to requirements and established procedures for the maintenance of overhead energised LV conductors and cables are obtained and confirmed for the purposes of the work to be performed and communicated. |
| | | 1.4 | Physical loads and calculations are confirmed according to requirements, using essential knowledge and appropriate skill. |
| | | 1.5 | Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures. |
| | | 1.6 | Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures. |
| | | 1.7 | Relevant work permits are obtained to access and perform work according to requirements and/or established procedures. |
| | | 1.8 | Resources including personnel, equipment, tools and personal protective equipment required for |

ELEMENT**PERFORMANCE CRITERIA**

- the job are obtained and confirmed in working order.
- 1.9 Specialist equipment for live working is inspected and confined in working order as per requirements and established procedures.
- 1.10 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
- 1.11 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.12 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.13 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.14 Traffic management plan is identified and implemented.
- 2 Carry out maintenance of overhead energised LV conductors and cables.
- 2.1 Environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
- 2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Essential knowledge and associated skills are applied in the safe maintenance of overhead energised LV conductors and cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.

ELEMENT**PERFORMANCE CRITERIA**

- | | | | |
|---|--|-----|---|
| 3 | Complete the maintenance of overhead energised LV conductors and cables. | 2.4 | Maintenance, including repair and/or replacement of poles and/or structures is carried out, in accordance with the work schedule and requirements/established procedures. |
| | | 2.5 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| | | 2.6 | Unplanned events in the maintenance of overhead energised LV conductors and cables are undertaken within the scope of established procedures. |
| | | 2.7 | Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills. |
| | | 2.8 | Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures. |
| | | 3.1 | Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures. |
| | | 3.2 | Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable. |
| | | 3.3 | Work site is rehabilitated, cleaned up and made safe in accordance with established procedures. |
| | | 3.4 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures. |
| | | 3.5 | Relevant work permit(s) are signed off and, overhead energised LV conductors and cables are returned to service in accordance with requirements. |
| | | 3.6 | Works completion records, reports, as installed /modified drawing and/or documentation and |

ELEMENT

PERFORMANCE CRITERIA

information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining overhead energised LV conductors and cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDP12A Low voltage energised working practices for distribution overhead

Evidence shall show an understanding of the safe working on energised low voltage equipment to an extent indicated by the following aspects:

T1 Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements

T2 Safety precautions specific to working on or near energised low voltage conductors encompassing:

- Safe working practices and procedures
- Identification of hazards, assessment and control of OHS risks
- Types, selection, maintenance and use of personal protective equipment

T3 Work on or near energised LV conductors encompassing:

- Types and function of specialised tools
- Safe working practices when using specialised tools
- Methods of using specialised tools

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least two of the following:	Copper Aluminium Aluminium/steel reinforced Steel Pilot
B	At least two of the following:	EWP Ladder Portable platform
C	All of the following:	Insulating mats/sleeves Temporary bridging device Insulating gloves Insulated cable tensioning devices Ladder/pole shrouds Equipotential bonding
D	At least three of the following:	Voltage detector* Clamp-on ammeter Polarity tester Insulation resistance tester Phase sequence indicator Recording meters (*must do)
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the

		above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of overhead energised LV conductors and cables

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of overhead energised low voltage conductors and cables taking into account the potential hazards, the calculation of physical loads, including an understanding of the effects of traffic loads and de-rating of circuits.

Maintenance may include the removal, repair and replacement of cables, conductors and associated hardware.

Structures include poles, and columns.

Work methods require the use of insulating gloves and specialised live working equipment and tools.

Work may be performed from elevating work platform, ladder, portable pole platform, or the ground.

Testing and recording devices include voltage detectors, tong ammeters, polarity testers, recording meters and phase sequence indicators.

Specialised live working equipment includes insulating mats and sleeves, insulating gloves, temporary bridges/hoppers, insulated cable tensioning devices and ladder/pole shrouds and equipotential bonding.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures

RANGE STATEMENT

- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements.
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Distribution

UETTDRDP13A Maintain energised HV distribution overhead electrical apparatus (stick)

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of energised high voltage distribution overhead electrical apparatus using high voltage live line sticks and includes the verification of the site conditions and the potential hazards, the conformation and calculation of physical loads and the selection of appropriate and authorised work method. It includes the preparation and cleaning of specialist material and tools in accordance with authorised technical instructions. It also encompasses the undertaking of OHS and safe working practices and the rendering inoperative of the automatic re-closing device including its restoration in accordance with the work plan and the procedure of issuing/accepting electrical access permits and or relevant working documents.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Pathway 1

Qualified and authorised Distribution Lineworker

Pathway 2

BSBWOR402A Promote team effectiveness

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. Circuits

UEENEEE105A Fix and secure electrotechnology

Prerequisite Unit(s)

4)

equipment

- UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications
- UEENEEG101A Solve problems in electromagnetic devices and related circuits
- UEENEEG102A Solve problems in low voltage a.c. Circuits
- UETTD RDP11A Inspect overhead poles/structures and electrical apparatus
- UETTD RDP12A Maintain overhead energised low voltage conductors and cables
- UETTD REL11A Apply sustainable energy and environmental procedures
- UETTD REL12A Operate plant and equipment near live electrical conductors and apparatus
- UETTD REL16A Working safely near live electrical apparatus
- UETTD RIS42A Maintain network infrastructure electrical equipment
- UETTD RIS52A Install and maintain poles, structures and associated hardware
- UETTD RIS54A Install and maintain poles, structures, overhead conductors and cables
- UETTD RIS65A Contribute to coordinated HV live working

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|---|---|
| 1 Plan to maintain energised high voltage distribution overhead electrical apparatus (stick) | 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination. |
| | 1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures. |
| | 1.3 Risk control measures are identified, prioritised and evaluated against the work schedule. |
| | 1.4 Relevant requirements and established |

ELEMENT

PERFORMANCE CRITERIA

- procedures for the work are communicated to all personnel and identified for all work sites.
- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
- 1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
- 1.8 Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
- 1.12 Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out maintenance of energised high voltage distribution overhead electrical apparatus (stick)	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.</p> <p>2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures.</p> <p>2.3 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.</p> <p>2.4 Auto-reclose devices associated with the circuits being worked on have been rendered inoperative and necessary work documentation acquired in accordance with enterprise requirements.</p> <p>2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.6 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.</p> <p>2.7 Maintenance of energised high voltage overhead electrical apparatus is carried out, in accordance with the work schedule and requirements and/or established procedures.</p> <p>2.8 Essential knowledge and associated skills are applied in the safe installation and maintenance of energised high voltage overhead electrical apparatus to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.9 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.</p> <p>2.10 Ongoing checks of quality of the work are undertaken in accordance with requirements and</p>

ELEMENT

PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
3 Complete the maintenance of energised high voltage distribution overhead electrical apparatus (stick)	established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard
	3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
	3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, energised high voltage apparatus is returned to service and advised to client/customer in accordance with requirements.
3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.	

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining energised high voltage distribution overhead electrical apparatus (stick).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDP13A Live lines working up to 132 kV with hotstick

Evidence shall show an understanding of live lines working up to 132 kV with hot stick to an extent indicated by the following aspects:

T1 Legislation and Regulations encompassing:

- Legislation, standards and codes
- Supply authority regulations
- Industry guidelines and enterprise requirements

T2 Safety Precautions for High Voltage Live Work up to and including 132 kV (poles) utilising live High Voltage stick method encompassing:

- Minimum approach distances
- OH&S hazard and precautions
- Assessing and controlling risks
- Effects of excessive conductor temperature on insulating equipment
- Personnel protective equipment
- Integrity of insulation
- Emergency response, first aid and rescue

T3 Policies and procedures for live High Voltage stick method up to and including 132 kV encompassing:

- Policies, procedures and practices
- Definition of terms
- Responsibilities of personnel
- Types of structures
- Types of equipment and compliance

T4 Stick techniques up to and including 132 kV encompassing:

- High Voltage insulators
- High Voltage crossarms
- High Voltage bridge connections
- Installation and maintenance of equipment
- Temporary Midspan switching devices
- Erection and replacement of poles

REQUIRED SKILLS AND KNOWLEDGE

- Replacement of conductors and cables
- High voltage armour rods and line guards
- Conversion intermediate to strain construction
- Switching devices

T5 Safety precautions for plant, equipment and tools encompassing:

- Safe working clearances
- Identification of OH&S hazards
- Assessing and controlling risks and hazards
- Personal protective equipment

T6 Identification and serviceability of plant, equipment and tools encompassing:

- Identification of plant, equipment and tools
- Serviceability of plant equipment and tools

T7 Operational use of plant, equipment and tools encompassing:

- Conductor supports
- Selecting conductor support method
- Calculation of loads
- Effects of secondary loading
- Effects of resultant forces
- Conductor support rigging procedures

T8 Electrical and electrostatic principles encompassing:

- Relationship with current, voltage and resistance as related to distribution lines
- Phase voltage and respective line voltages
- Production of an electric field

T9 High voltage insulation encompassing:

- Construction of insulators
- Checking integrity of insulation prior to work commencement
- Effects of electrical fields on insulators
- Number of disc insulators needed
- Performance of a failed insulator on the line and system
- Minimum number of discs per string
- Detecting a failed insulators

T10 Effects of electrostatic Induction on the human body encompassing:

- Electrostatic induction and the human body

T11 Switching surges and magnetic fields encompassing:

- Lightning and switching surges
- Magnetic fields

REQUIRED SKILLS AND KNOWLEDGE

T12 High Voltage switching fundamentals encompassing:

- Manuals system diagrams/plans and drawings
- High Voltage live work access authority/permit system
- Fault current protection devices
- Disabling auto-reclose function
- Network interconnectors
- Test instruments
- Types of switchgear
- High Voltage electrical faults
- Types
- Causes
- Effects

T13 High voltage SWER system encompassing:

- Components
- Circuit arrangement
- Operation principles
- Faulty SWER earth system

T14 Safety Observer principles encompassing:

- Duties
- Techniques
- Minimum Approach Distances (MAD)
- Minimum safe working distance from vegetation

T15 Teamwork High Voltage Live Work

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	Install/replace structures Install/replace hardware (e.g. crossarm and insulator) Repair conductors Install/replace/connect bridge/bonding connections
B	At least two of the following:	Install/replace pole mounted reclosers Install/repair/replace air brake switches Install/repair/replace high voltage links/disconnects Install/remove temporary high voltage links/high voltage fuses Washing insulators Install/repair/replace expulsion drop-out fuses Install/replace lightning arrestors Install/replace vibration dampers or aircraft warning markers
C	At least two of the following:	EWP Ladder Pole platform Insulated structure
D	At least one of the following:	Voltage detector Leakage detector Insulation test equipment

E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of energised high voltage overhead electrical apparatus (stick).

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of energised HV distribution overhead electrical apparatus and may include the following

Types of conductor may include bare aluminium; steel cored aluminium, steel and copper conductors and insulated unscreened conductor (IUC) systems.

Maintenance work may include -

The replacement and repair or installation of structures, associated hardware and conductors, and the installation, repair, replacement or connection of bridges/bonding connections.

The repair/replacement/installation of electrical equipment and associated components whose current carrying parts are exposed, e.g. Air break switches, High Voltage links or disconnects and expulsion drop-out fuses. Pole mounted reclosers, transformers, sectionalisers, lightning arresters and High Voltage cables.

The washing of insulators.

The commissioning of High Voltage electrical apparatus

Distribution structures may be wood, steel, concrete or composite.

Conductor voltage will generally not exceed 132 kV.

Work may be performed from elevating work platform, ladder, portable pole platform or insulated scaffold and may include the use of a gin pole.

Testing and recording equipment includes phasing sticks, fault indicators, voltage detectors, leakage detectors insulation testers and test equipment for live-line tools.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications

RANGE STATEMENT

- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Distribution.

UETTDRDP14A Maintain energised HV distribution overhead electrical apparatus (glove)

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of energised high voltage distribution overhead electrical apparatus using high voltage live line glove and barrier method and includes the verification of the site conditions and the potential hazards, the conformation and calculation of physical loads and the selection of appropriate and authorised work method. It includes the preparation and cleaning of specialist material and tools in accordance with authorised technical instructions. It also encompasses the undertaking of OHS and safe working practices and the rendering inoperative of the automatic re-closing device including its restoration in accordance with the work plan and the procedure of issuing/accepting electrical access permits and or relevant working documents.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Pathway 1

Qualified and authorised Distribution Lineworker

Pathway 2

Unit Code	Unit Title
BSBWOR402A	Promote team effectiveness
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits

Prerequisite Unit(s)	4)
	UEENEEE105A Fix and secure electrotechnology equipment
	UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A Solve problems in electromagnetic devices and related circuits
	UEENEEG102A Solve problems in low voltage a.c. Circuits
	UETTDRDP11A Inspect overhead poles/structures and electrical apparatus
	UETTDRDP12A Maintain overhead energised low voltage conductors and cables
	UETTDREL11A Apply sustainable energy and environmental procedures
	UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A Working safely near live electrical apparatus
	UETTDRIS42A Maintain network infrastructure electrical equipment
	UETTDRIS52A Install and maintain poles, structures and associated hardware
	UETTDRIS54A Install and maintain poles, structures, overhead conductors and cables
	UETTDRIS65A Contribute to coordinated HV live working

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in

Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|--|--|
| 1 Plan to maintain energised high voltage distribution overhead electrical apparatus (glove and barrier) | 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination. |
| | 1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures. |
| | 1.3 Risk control measures are identified, prioritised and evaluated against the work schedule. |

ELEMENT

PERFORMANCE CRITERIA

- 1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
- 1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
- 1.8 Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
- 1.12 Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out maintenance of energised high voltage distribution overhead electrical apparatus (glove and barrier)	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
	2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures.
	2.3 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements and including the use of high voltage live line sticks.
	2.4 Auto-reclose devices associated with the circuits being worked on have been rendered inoperative and necessary work documentation acquired in accordance with enterprise requirements.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
	2.7 Maintenance of energised high voltage distribution overhead electrical apparatus is carried out, in accordance with the work schedule and requirements and/or established procedures.
	2.8 Essential knowledge and associated skills are applied in the safe maintenance of energised high voltage distribution overhead electrical apparatus to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.9 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.

ELEMENT

PERFORMANCE CRITERIA

	2.10	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
3 Complete the maintenance of energised high voltage distribution overhead electrical apparatus (glove and barrier)	3.1	Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
	3.3	Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5	Relevant work permit(s) are signed off and, energised high voltage apparatus is returned to service and advised to client/customer in accordance with requirements.
	3.6	Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining energised high voltage distribution overhead electrical apparatus (glove).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDP14A Live line working up to 33 kV with glove and barrier

Evidence shall show an understanding of live lines working up to 33 kV with glove and barrier to an extent indicated by the following aspects:

T1 Legislation and Regulations encompassing:

- Legislation, standards and codes
- Supply authority regulations
- Industry guidelines and enterprise requirements

T2 Safety Precautions for High Voltage Live Work associated to Glove and Barrier encompassing:

- Minimum approach distances
- OH&S hazard and precautions
- Assessing and controlling risks
- Personnel protective equipment
- High Voltage live work access
- Auto-reclose function
- Fault current protective devices
- Integrity of insulation
- Specialised equipment and tools
- Inspection of equipment and tools
- Use of specialised equipment and tools
- Work team communication
- Use of safety observers
- Emergency response, first aid and rescue

T3 Policies and procedures for glove and barrier work up to and including 33 kV encompassing:

- Policies, procedures and practices
- Definition of terms
- Responsibilities of personnel
- Types of structures
- Types of equipment and compliance

REQUIRED SKILLS AND KNOWLEDGE

T4 Glove and barrier techniques up to and including 33 kV encompassing:

- High Voltage insulators
- High Voltage cross arms
- High Voltage bridge connections
- Installation and maintenance of equipment
- Temporary Midspan switching devices
- Erection and replacement of poles
- Replacement of conductors and cables
- High voltage armour rods and line guards
- Conversion intermediate to strain construction
- Switching devices

T5 Safety precautions for plant, equipment and tools encompassing:

- Safe working clearances
- Identification of OH&S hazards
- Assessing and controlling risks and hazards
- Personal protective equipment

T6 Identification and serviceability of plant, equipment and tools encompassing:

- Identification of plant, equipment and tools
- Serviceability of plant equipment and tools

T7 Operational use of plant, equipment and tools encompassing:

- Conductor supports
- Selecting conductor support method
- Calculation of loads
- Effects of secondary loading
- Effects of resultant forces
- Conductor support rigging procedures
- Displacement of conductors utilising rigging equipment

T8 Electrical and electrostatic principles encompassing:

- Relationship with current, voltage and resistance as related to distribution lines
- Phase voltage and respective line voltages
- Production of an electric field

T9 High voltage insulation encompassing:

- Construction of disc insulators
- Construction of a polymeric insulator
- Checking integrity of insulation prior to work commencement
- Effects of electrical fields on disc insulators
- Number of disc insulators needed

REQUIRED SKILLS AND KNOWLEDGE

- Performance of a failed disc insulator on the line and system
- Minimum number of discs per string
- Detecting a failed disc insulators

T10 Effects of electrostatic Induction on the human body encompassing:

- Electrostatic induction and the human body
- Application of a faraday cage

T11 Switching surges and magnetic fields encompassing:

- Lightning and switching surges
- Magnetic fields

T12 High Voltage switching fundamentals encompassing:

- Standards and requirements - Standards, codes, legislation, supply authority regulations, industry guidelines and enterprise requirements
- Manuals system diagrams/plans and drawings
- High Voltage live work access authority/permit system - Operational forms - High voltage switching or outage requests
- Fault current protection devices - main and backup devices, components, types, categories, applications, functions, principle of operation, co-ordination, zoning, auto-reclosing suppression, paralleling and separating and ring verses radial feeders
- Disabling auto-reclose function
- Network interconnectors
- Test instruments
- Types and categories of switchgear - application, function and operating capabilities; restrictions
- Operate switching apparatus - identifying hazards, assessing risks, systematic and defensive techniques, mobile radio, double insulation
- High Voltage electrical faults: types, causes and effects

T13 High voltage SWER system encompassing:

- Components
- Circuit arrangement
- Operation principles
- Faulty SWER earth system
- SWER substations

T14 Safety Observer principles encompassing:

- Duties
- Techniques
- Minimum Approach Distances (MAD)
- Minimum safe working distance from vegetation

REQUIRED SKILLS AND KNOWLEDGE

T15 Feeder automation system encompassing:

- Function
- Main components
- Field devices
- SCADA systems, interlocks and operation

T16 System Control and Data Acquisition (SCADA) systems encompassing:

- Function and main components
- Security interlocks and access restrictions
- Switching apparatus and retrieving data operation
- Field devices operation

T17 Teamwork High Voltage Live Work

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	Install/replace structures Install/replace hardware (e.g. crossarm and insulator) Repair conductors Install/replace/connect bridge/bonding connections
B	At least two of the following:	Install/replace pole mounted reclosers Install/repair/replace air brake switches Install/repair/replace high voltage links/disconnects Install/remove temporary high voltage links/high voltage fuses Install/repair/replace expulsion drop-out fuses Install/replace lightning arrestors Install/replace vibration dampers or aircraft warning markers
C	At least two of the following:	EWP Ladder Pole platform Insulated structured
D	At least one of the following:	Voltage detector Leakage detector Insulation test equipment
E	At least one	Dealing with an

	occasion	unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of energised high voltage overhead electrical apparatus.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of energised HV distribution overhead electrical apparatus and may include the following:

Types of conductor may include bare aluminium; steel cored aluminium, steel and copper conductors and insulated unscreened conductor (IUC) systems.

Maintenance work may include -

The replacement and repair or installation of structures, associated hardware and conductors, and the installation, repair, replacement or connection of bridges/bonding connections.

The repair/replacement/installation of electrical equipment and associated components whose current carrying parts are exposed, e.g. air break switches, High Voltage links or disconnects and expulsion drop-out fuses. Pole mounted reclosers, transformers, sectionalisers, lightning arresters and High Voltage cables.

The commissioning of High Voltage electrical apparatus

Distribution structures may be wood, steel, concrete or composite.

Conductor voltage will not exceed 33 kV.

Work may be performed from elevating work platform, ladder, portable pole platform or insulated scaffold and may include the use of a gin pole.

Testing and recording equipment includes phasing sticks, fault indicators, voltage detectors, leakage detectors insulation testers and test equipment for live-line tools.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency

RANGE STATEMENT

- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Distribution.

UETTDRDP15A Inspect, maintain and restore energised low voltage overhead distribution network infrastructure

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the inspection of overhead structures such as poles and/or other structures other than towers and the maintenance of overhead energised low voltage conductors and cables. It includes the conducting of low voltage switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule and in accordance with enterprise procedures. It covers low voltage distribution systems in field situations but also includes paralleling in accordance with the switching schedule. It also includes inspection of electrical apparatus such as, overhead conductors and or cables, underground and overhead transition points, electrical equipment, such as pole-mounted transformers, switchgear, hardware and or earthing systems. It encompasses the completion of inspection reports and other relevant documentation in accordance with requirements.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment

Prerequisite Unit(s)	4)
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UEENEEG103A	Install low voltage wiring and accessories
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical

Prerequisite Unit(s)	4)	control circuits
		Apply environmentally and sustainable energy procedures in the energy sector
UEENEEK142A		
		Working safely near live electrical apparatus
UETTDREL16A		
		Install and maintain ESI network infrastructure electrical equipment
UETTD R IS46A		
		Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD R IS62A		
		Implement and monitor the power system environmental and sustainable energy management policies and procedures
UETTD R IS63A		
		Solve problems in energy supply network equipment
UETTD R IS67A		

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the inspection, maintenance and restoration of overhead distribution network infrastructure	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 OHS policies and procedures related to requirements and established procedures for the, inspection of overhead structures and electrical apparatus used on poles and/or structures, the maintenance of overhead energised LV conductors and cables and LV switching, are obtained and confirmed for the purposes of the work to be performed and communicated.
	1.4 Physical loads and calculations are confirmed according to requirements, using essential knowledge and appropriate skill.
	1.5 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
	1.6 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.

ELEMENT	PERFORMANCE CRITERIA
	1.7 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
	1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
	1.9 Specialist equipment for live working is inspected and confirmed in working order as per requirements and established procedures.
	1.10 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
	1.11 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.12 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.13 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.14 Traffic management plan is identified and implemented.
2 Carry out inspection, maintenance and restoration of overhead distribution network infrastructure	2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements

ELEMENT

PERFORMANCE CRITERIA

- confirmed.
- 2.3 Essential knowledge and associated skills are applied in the safe maintenance and restoration of overhead distribution network infrastructure to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.4 Inspection of overhead structures and electrical apparatus used on poles and/or structures is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.5 Maintenance, including repair and/or replacement of poles and/or structures is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.6 Communications with Switching Control Officer are established and maintained throughout the isolation operation according to established procedures.
- 2.7 Electrical equipment and associated circuits line/network or work site to be switched including paralleling is isolated and proved de-energised using appropriate devices and earthed where required according to requirements and established procedures.
- 2.8 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.9 Unplanned events during the inspection, maintenance or switching procedures are undertaken within the scope of established procedures.
- 2.10 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.

ELEMENT	PERFORMANCE CRITERIA
	2.11 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the inspection, maintenance and restoration of overhead distribution network infrastructure	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, overhead structures and electrical apparatus used on poles and/or structures are returned to service in accordance with requirements.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of inspecting, maintenance and restoration of overhead distribution network infrastructure.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDP15A Network infrastructure LV overhead distribution

Evidence shall show an understanding of the network infrastructure inspection, maintenance and restoration of energised low voltage overhead distribution to an extent indicated by the following aspects:

T1 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker's body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair
- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

REQUIRED SKILLS AND KNOWLEDGE

T2 Low voltage - energised low voltage equipment working practices for substations encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on or near energised low voltage conductors - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.
- Work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, release and rescue procedures for work on or near exposed energised LV conductors.

T3 Poles and structures inspection principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Characteristics of wood used for structures within the electrical distribution system - relationship between timber and water, faults that occur that influence the integrity of the structure, affects of fungal activity, affects of termite and borer activity, affects of dry rot.
- Chemical treatment principles - types of chemical used to treat timber, regulations and procedures in handling and transporting chemicals safely, application procedures of chemicals to wood
- Deterioration prevention techniques - relationship between steel, concrete and wood, inspection procedures for deterioration, deterioration prevention procedures in steel, concrete and wood, procedures for the repair of deterioration in steel, concrete and wood

T4 Powerline inspection principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Ground line inspection procedures of electrical distribution structures - requirements for pole inspection on electrical distribution structures, use of specific equipment and testing devices during testing/inspection, methods of recording data
- Overhead line inspection procedures of electrical distribution structures - methods and requirements for overhead line inspection on electrical distribution structures, clearances for overhead conductors, cables and structures, use of specific equipment and testing devices during testing/inspection, methods of recording data
- Underground cable inspection procedures in the electrical distribution system - state industry policy and regulations, methods and requirements for line inspection on underground cable terminations

T5 Installation of switchgear and associated equipment encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques
- Types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- Installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques, pole mounted locations
- Maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry standards and procedures,
- Testing and commissioning - electricity supply industry standards and procedures

T6 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

Evidence Guide

EVIDENCE GUIDE

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can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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- A representative body of performance criteria demonstrated

within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
- Apply sustainable energy principles and practices as specified in the performance criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Inspect any three of the following overhead structures and electrical apparatus:	Poles and structures Overhead conductors/cables Underground/overhead transition points Electrical equipment Hardware Earthing systems
B	With regards to "A" incorporate at least one of the following:	Ground Vehicle Helicopter

		Fixed wing
C	With regards to "A" incorporate at least two of the following:	Visual* Infra-red camera X-ray Camera (*must Do)
D	Maintain at least two of the following overhead energised LV conductors and cables:	Copper Aluminium Aluminium steel Steel Pilot
E	With regards to "D" incorporate at least two of the following:	EWP Ladder Portable platform
F	With regards to "D" incorporate all of the following:	Insulating mats/sleeves Temporary bridging device Insulating gloves Insulated cable tensioning devices Ladder/pole shrouds Equipotential bonding
G	With regards to "D" incorporate at least three of the following:	Voltage detector* Clamp-on ammeter Polarity tester Insulation resistance tester Phase sequence indicator Recording meters (*must do)
H	Perform LV switching to a given schedule and	Approvals/clearances Access

	incorporate all of the following:	authority/permits
I	With regards to "H" incorporate two of the following:	Voltage detectors Polarities testers Phase rotation indicators
J	With regards to "H" incorporate one of the following:	LV links LV bridges LV fuses
K	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual inspection, maintenance and restoration of energised LV overhead distribution network infrastructure.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the inspection, maintenance and restoration of overhead distribution network infrastructure.

Inspection may be carried out on foot, and/or by conventional ground-based vehicle, or from the air. Aircraft may be helicopters or fixed-wing types.

Inspection techniques include use of X-ray and infrared camera.

Items to be inspected may include overhead poles and or structures, but not towers.

Types of electrical apparatus to be inspected include overhead conductors and cables, overhead transition points and, electrical equipment such as pole-mounted transformers and air-break switches, hardware, such as insulators, surge arrestors and cross-arms and or earthing systems.

The maintenance of overhead energised low voltage conductors and cables must take into account the potential hazards, the calculation of physical loads, including an understanding of the effects of traffic loads and de-rating of circuits.

Maintenance may include the removal, repair and replacement of cables, conductors and associated hardware.

Structures include poles, and columns.

Work methods require the use of insulating gloves and specialised live working equipment and tools.

Work may be performed from elevating work platform, ladder, portable pole platform, or the ground.

Testing and recording devices include voltage detectors, tong ammeters, polarity testers, recording meters and phase sequence indicators.

Specialised live working equipment includes insulating mats and sleeves, insulating gloves, temporary bridges/hoppers, insulated cable tensioning devices and ladder/pole shrouds and equipotential bonding.

Low voltage switching operation may involve the operation of circuit breaking and isolation devices from a given switching schedule as it relates to low voltage distribution systems in field situations but also includes paralleling with the switching schedule.

Operating circuit isolation devices associated with energy reticulation systems/networks is confined to low voltage systems in field situations which performed in accordance with a switching schedule and established procedures.

Switchgear may include Low Voltage fuses, Low Voltage links and bridges.

Specialist tools and devices may include Low Voltage detectors, Low Voltage polarity testers Low Voltage phase rotation indicators.

Switching programs/schedule refers to structure, switch or equipment number, locations, Low Voltage distributor, spur or feeder, outage times, work order/plan.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
Distribution

UETTDRDP99A Test and verify distribution overhead installations

Modification History

Release	Action	Core/Elective	Details	Points
2	Edit	N/A	Corrected must do item in Group E of Evidence Guide	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers inspection and testing to verify whether a distribution Overhead Installation is safe and complies with all requirements. It encompasses working safely, visual inspections and mandatory, optional and functional test procedures, identifying non-compliance defects and mandatory reporting requirements.

Application of the Unit

Application of the Unit 2)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit require a license to practice in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly

License to practice**3)**

related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the access to High Voltage and Low Voltage distribution network installations, operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment.

2. Compliance may be required in various jurisdictions relating to currency in ESI Rescue Procedures, CPR/First Aid, confined space, lifting and risk safety measures.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment

Prerequisite Unit(s)	4)	
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETDRDP11A	Inspect overhead poles/structures and electrical apparatus
	UETDRDP12A	Maintain overhead energised low voltage conductors and cables
	UETDREL11A	Apply sustainable energy and environmental procedures
	UETDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETDREL16A	Working safely near live electrical apparatus
	UETDRIS41A	Install network infrastructure electrical equipment
	UETDRIS42A	Maintain network infrastructure electrical equipment
	UETDRIS52A	Install and maintain poles, structures and associated hardware
	UETDRIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETDRIS56A	Install and maintain low voltage overhead services

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|--|-----|---|
| 1 | Prepare to visually inspect, test and verify overhead distribution installation. | 1.1 | Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection. |
| | | 1.2 | Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites |
| | | 1.3 | OHS policies and procedures related to requirements and established procedures for accessing, testing and verification of overhead distribution installations are obtained and confirmed for the purposes of the work to be performed and communicated. |
| | | 1.4 | Work is prioritised and sequenced following |

ELEMENT**PERFORMANCE CRITERIA**

- consultation with others for completion within acceptable timeframes and in accordance with established procedures.
- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures
- 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Specialist test and measurement equipment for testing and verification of overhead distribution installations are obtained, inspected and confirmed in working order and calibrated as per requirements and established procedures
- 1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.12 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures
- 1.13 Road signs, barriers and warning devices are positioned in accordance with requirements.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out visual inspection, test and verification of overhead distribution installation.	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.</p> <p>2.2 Lifting, climbing, working in confined spaces and aloft, use of power tools/equipment, test equipment, test and measurement equipment, techniques and practices are safely followed and, currency according to requirements confirmed.</p> <p>2.3 Essential knowledge and associated skills are applied in the inspection, safe access, testing and verification of overhead distribution installations to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.4 Overhead distribution installations and associated hardware is visually inspected and confirmed as positioned, secured and terminated/connected in accordance with requirements and established procedures.</p> <p>2.5 Energised tests and/or measurements, if required, to verify overhead distribution installations is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.6 Overhead distribution installations is checked for suitability and conformance with organisational construction standards and electrical network supply standards</p> <p>2.7 Overhead distribution installation protection methods and devices are validated as meeting organisational construction and distribution network protection standards.</p> <p>2.8 Overhead distribution installation switchgear is validated as being appropriately rated and meeting functional requirements of organisational construction and distribution network protection standards</p>

ELEMENT**PERFORMANCE CRITERIA**

- 2.9 Overhead distribution installations earthing system and MEN system components are verified as correctly installed and conforming to organisational construction and distribution network standards.
- 2.10 Mandatory tests are conducted to verify that overhead distribution installation:
- Distribution system phasing, phase rotation and polarity is correct and conform to network construction standards.
 - Electrical distribution network voltage levels comply with network supply standards.
 - Potential present upon distribution network neutral conductors conform network supply standards.
- 2.11 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.12 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.13 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 3 Report inspection and test findings.
- 3.1 OHS risk control work completion measures and procedures are followed.
- 3.2 Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies corrected/ reported in accordance with established procedures.
- 3.3 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
- 3.4 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.

ELEMENT**PERFORMANCE CRITERIA**

- 3.5 Non-compliance defects are identified, corrected and/or reported in accordance with established procedures.
- 3.6 Recommendations for rectifying defects are made in accordance with established procedures.
- 3.7 Mandatory documentation is completed in accordance with established procedures.
- 3.8 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.9 Relevant work permit(s) are signed off and, electrical equipment (network infrastructure) are returned to service in accordance with requirements.
- 3.10 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of inspecting overhead structures and electrical apparatus (poles /structures).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDP99A Test and verify distribution overhead installations

Evidence shall show an understanding of distribution overhead installations testing and verification to an extent indicated by the following aspects:

T1 Legislated regulations encompassing:

- legislation and regulations that require installations and equipment to be tested to ensure they are safe.
- the person/bodies responsible for the various aspects of ensuring distribution overhead installations are safe.
- results of tests that show a distribution overhead installation is safe for connection to the supply.
- results of periodic inspection and tests that show construction site wiring and equipment is safe to use.
- results of periodic inspection and tests that show the distribution overhead installations electrical equipment are safe to use.

T2 Testing installations encompassing:

- Distribution system phasing, phase rotation and polarity is correct and conform to network construction standards.

T3 Documentation encompassing:

- results of tests conducted on a distribution overhead installation in accordance with work package requirements and ensure the distribution overhead installation is safe.
- documents of periodic inspection and testing of distribution overhead installation and equipment in accordance with requirement.
- Non-compliances and defects reported in accordance with established procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships.

However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment

Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum	Item List

	number of items on which skill is to be demonstrated	
A	At least two of the following:	Visual* Infra-red camera X-Ray Camera Binoculars/telescope (* must do)
B	Any one of the following:	Pyramid Delta pi Enterprise specific type
C	At least three of the following	Insulators Clamps Bolts Conductor spacers Vibration dampers Structural components
D	At least one of the following	Copper Aluminium Steel Aluminium/steel reinforced
E	At least two of the following	Elevated work platform* Portable platform Gondola Hook ladder Elevated work box (*must do)
F	All of the following	Voltage/ de-energised indicating device Earthing conductors

G	All of the following	Reporting procedures Reporting outcomes
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Network constructions standards
- Network supply standards
- Suitable work environment, facilities, equipment and materials to undertake actual inspection of overhead structures and electrical apparatus.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working aloft (upon pole/structure or from EWP), below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation, inspection and maintenance of overhead distribution installations and includes

Distribution network installations and associated hardware which may include relevant distribution line/network high voltage overhead; conductors, groundwires, insulators, structural members, structural hardware, vibration dampers, conductor spacers, conductor repair, performed patch rods

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Authorisation
- Confined space
- Pre-commissioning testing and measurement
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Network construction standards
- Network supply standards
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Distribution

UETTD31A Draft and layout a power system overhead distribution extension

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the planning and layout of one or two pole minor overhead distribution extensions, including the estimating of the costs and/or resources for the work to be undertaken. It also encompasses on-the-job design, surveying techniques and layout to the field locations as per enterprise requirements.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

License to practice**3)**

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus

Prerequisite Unit(s) 4)

UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to draft and layout an overhead distribution extension	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained and analysed, if necessary, by site inspection and the extent of the work determined for planning and coordination.
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
	1.8 Clients/Customers are provided with possible solutions and /or options within the scope, acceptable cost and requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.

ELEMENT**PERFORMANCE CRITERIA**

- | | |
|------|--|
| 1.10 | Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures. |
| 1.11 | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures. |
| 1.12 | Positioning of road signs, barriers and warning devices is planned in accordance with requirements. |
| 2 | Carry out drafting and layout of an overhead distribution extension |
| 2.1 | OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures. |
| 2.2 | First Aid, Pole Top Rescue and other related work procedures are performed according to requirements and/or established procedures. |
| 2.3 | Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements. |
| 2.4 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| 2.5 | Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures. |
| 2.6 | The drafting and layout of an overhead distribution extension is carried out, in accordance with the work schedule and requirements and/or established procedures. |
| 2.7 | Essential knowledge and associated skills are applied for the drafting and layout of an |

ELEMENT**PERFORMANCE CRITERIA**

		overhead distribution extension to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3	Complete drafting and layout of an overhead distribution extension	
	3.1	Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
	3.3	Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5	Relevant work permit(s) are signed off and the job is returned to service and advised to client/customer in accordance with requirements.
	3.6	Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of drafting and laying out an overhead distribution extension.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS31A Power system overhead distribution extension

Evidence shall show an understanding of the power system overhead distribution extension to an extent indicated by the following aspects:

T1 Installation of overhead distribution conductors encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length.
- Constructions types and structures for distribution and sub transmission lines
- Types, sizes and characterises of overhead conductors
- Resources for the stringing and maintenance of conductors - types of low and high voltage overhead electrical conductor connections, causes and effects of poor electrical connections, reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors, minimum clearances between overhead conductors and low and high voltage structures.
- Techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of low and high voltage conductors.

T2 Installation of poles and or structures and hardware encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing poles and associated hardware
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - characteristics and applications of different types of poles and associated hardware
- Techniques for installing poles and associated hardware - types of installation equipment/tools, excavation methods, types of footings/foundations, types of attachments, earthing systems, clearances between conductors, safe methods of erecting and stabling poles and or structures and cross arms.
- Techniques for maintenance of poles and associated hardware - stabilisation techniques for unstable poles, methods of strengthen poles, maintenance and replacement of high voltage insulators and cross arms.

T3 Different types and function of distribution components encompassing:

- Commonwealth/State/Territory and local government legislation, Standards,

REQUIRED SKILLS AND KNOWLEDGE

codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of distribution components

- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
- Types, function and characteristics of distribution components
- Safety policies and procedures precautions related to the handling and installing distribution components.

T4 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams.

T5 Power distribution network documentation encompassing:

- Requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, instruction/worksheets sheets.
- Interpretation of different diagrams and documentation on LV and HV systems - overhead distribution extensions, underground distribution extensions, distribution substation, street lighting system.

T6 Layout principles for overhead distribution encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to overhead distribution layout
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components such as equipment, poles, cross-arms, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards, minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length -
- Resources needed for the stringing and maintenance of conductors

REQUIRED SKILLS AND KNOWLEDGE

- Types of low LV and HV overhead electrical conductor connections. Minimum clearances between overhead conductors and low LV and/HV structures
- Estimation of the duration of overhead distribution extension project

T7 Fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply and aviation authority regulations and or enterprise requirements applicable to the surveying for an overhead and underground extension
- Techniques in measuring heights and distances
- Techniques in taking bearings angles of deviation using a compass
- Techniques in using a clinometer
- Techniques in recording and storage of data
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
- Techniques in plotting long spans - measuring stick, clinometer, trundle wheel, tapes, correction for sloping ground, distance across objects and range rods
- Techniques in pegging pole positions - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs

T8 Fundamentals of computer aided drafting (CAD) for drafting and layout of distribution extension and upgrades encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the drafting and layouts of distribution extensions and upgrades
- Types of computer hardware and software, tools and equipment for the production of a draft and layout of distribution extension and or upgrade
- Techniques in storing and retrieving programs and files from the computer
- Identification and methods of retrieving and manipulating, digital symbols, designs, layouts, fonts and graphs stored in the computer
- Techniques in using the CAD package in following necessary commands and protocols in accordance with the operating instructions of the CAD software manufacturer
- Note: Examples include using file structure, menu utilisation, system library usage, data banking, achieving, file management and maintenance procedures
- Calculation of dimensions and drafting measurements using the computer
- Techniques in the preparation of preliminary sketches using the computer
- Techniques in using 2D computer graphics system and associated equipment to produce a distribution extension and or upgrade draft or layout
- Techniques to diagnosing basic faults in computer operation
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment

instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables

Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least one of the following:	Produce an LV single phase distribution extension plan/layout Produce an LV multi-phase distribution extension plan/layout
B	At least one of the following:	Layout a HV single phase distribution extension Layout a HV multi-phase distribution extension
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual drafting and layout of an overhead distribution extension.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3

metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Unit shall be demonstrated in relation to undertaking a draft and layout of an overhead distribution extension and may include the following equipment:

Pole, including wood, concrete, steel and composite), associated hardware, including conductors (bare wire and aerial bundle cable), crossarms, insulators, ACR, regulator, earthing, air break switches, gas switches, capacitor units, transformers, links, fuses, sectionalisers, lead arrestors, HV switchgear, LV switchgear, control boxes, communications equipment, lanterns, signage, supervisory cable, cable TV, substations, relevant protection systems and associated civil works.

Drafting equipment, computer or manual Powerline design software, mechanical and/or electrical survey equipment including; measuring tapes and chains, levels, inclinometer, measuring wheels and integrated survey stations.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume. They form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation

RANGE STATEMENT

- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS32A Draft and layout a power system underground distribution extension

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the planning and layout of minor HV and LV underground distribution extensions, including the estimating of the costs and/or resources for the work to be undertaken. It also encompasses on-the-job design, surveying techniques, the pegging and/or marking out of the trench position, the pit/pillar position and the cable position according to the work order and enterprise requirements.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETTDREL11A	Apply sustainable energy and environmental procedures

Prerequisite Unit(s) 4)

UETTDREL16A	Working safely near live electrical apparatus
UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to draft and layout an underground distribution extension	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained and analysed, if necessary, by site inspection and the extent of the work determined for planning and coordination.</p> <p>1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.</p> <p>1.3 Risk control measures are identified, prioritised and evaluated against the work schedule.</p> <p>1.4 Relevant requirements and established procedures for the work are to all personnel and identified for all work sites.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.</p> <p>1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and</p>

ELEMENT	PERFORMANCE CRITERIA
	technical working order.
	1.8 Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
	1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.12 Positioning of road signs, barriers and warning devices is planned in accordance with requirements.
2 Carry out drafting and layout of an underground distribution extension	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.</p> <p>2.2 First Aid, Pole Top Rescue and other related work procedures are performed according to requirements and/or established procedures.</p> <p>2.3 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.</p> <p>2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p>

ELEMENT

PERFORMANCE CRITERIA

- 2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
- 2.6 The drafting and layout of an underground distribution extension is carried out, in accordance with the work schedule and requirements and/or established procedures.
- 2.7 Essential knowledge and associated skills are applied for drafting and layout of an underground distribution extension to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
- 2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard.
- 3 Complete drafting and layout of an underground distribution extension
 - 3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
 - 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures
 - 3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
 - 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
 - 3.5 Relevant work permit(s) are signed off and the

ELEMENT

PERFORMANCE CRITERIA

job is returned to service and advised to client/customer in accordance with requirements.

3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of drafting and laying out an underground distribution extension

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS32A Power system underground distribution extension

Evidence shall show an understanding of the power system underground distribution extension to an extent indicated by the following aspects:

T1 Installation of underground cable encompassing:

- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Safety precautions specific to the installation of underground cable - excavation and trench safety regulations, gas detection procedures, working in confined spaces, personal protective equipment, hazards for the use of LPG equipment for jointing of underground cable, gas bottle testing procedures, permit to work systems and isolation procedures.
- Trench excavation and reinstatement procedures
- Installation of underground cable procedures - types of tools and equipment, methods of installing conduits, methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)
- Procedures for the safe use of LPG equipment for cable jointing.

T2 Construction and types of underground cables encompassing:

- Safety precautions specific to handling underground cables
- Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- Types and applications of UC
- Construction types and structures of underground cables
- Characteristics of different types of underground cables
- Ratings.

T3 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching

REQUIRED SKILLS AND KNOWLEDGE

diagrams.

T4 Power distribution network documentation encompassing:

- Requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, instruction/worksheets sheets.
- Interpretation of different diagrams and documentation on LV and HV systems - overhead distribution extensions, underground distribution extensions, distribution substation, street lighting system.

T5 Fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply and aviation authority regulations and or enterprise requirements applicable to the surveying for an overhead and underground extension
- Techniques in measuring heights and distances
- Techniques in taking bearings angles of deviation using a compass
- Techniques in using a clinometer
- Techniques in recording and storage of data
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
- Techniques in plotting long spans - measuring stick, clinometer, trundle wheel, tapes, correction for sloping ground, distance across objects and range rods
- Techniques in pegging pole positions - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs

T6 Fundamentals of computer aided drafting (CAD) for drafting and layout of distribution extension and upgrades encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the drafting and layouts of distribution extensions and upgrades
- Types of computer hardware and software, tools and equipment for the production of a draft and layout of distribution extension and or upgrade
- Techniques in storing and retrieving programs and files from the computer
- Identification and methods of retrieving and manipulating, digital symbols, designs, layouts, fonts and graphs stored in the computer
- Techniques in using the CAD package in following necessary commands and protocols in accordance with the operating instructions of the CAD software manufacturer
- Note: Examples include using file structure, menu utilisation, system library usage, data banking, achieving, file management and maintenance procedures

REQUIRED SKILLS AND KNOWLEDGE

- Calculation of dimensions and drafting measurements using the computer
- Techniques in the preparation of preliminary sketches using the computer
- Techniques in using 2D computer graphics system and associated equipment to produce a distribution extension and or upgrade draft or layout
- Techniques to diagnosing basic faults in computer operation

T7 Layout principles for underground mains distribution extension encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to underground mains distribution extension
- Requirements for the use of underground mains construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components and equipment, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards, minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length
- Resources needed for the laying of conductors
- Determining the appropriate excavation for the location
- Determining the size and depth of excavation
- Determining the trench and pit layout procedures
- Minimum clearances between conductors
- Estimation of the duration of underground distribution extension project

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least one of the following:	Produce a HV multi-phase underground distribution extension plan/layout Produce an LV multi-phase underground distribution extension plan/layout
B	At least one of the following:	Layout an LV multi-phase underground distribution extension Layout a HV multi-phase underground distribution extension
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual drafting and layout of an underground distribution extension.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the draft and layout of an underground distribution extension and may include the following:

Underground cable, terminations, joints, Substations, mechanical protection, HV Switchgear, LV Switchgear, signage, relevant protection systems, relevant protection systems including fuses and circuit breakers and associated civil works.

Drafting equipment, computer or manual Powerline design software, mechanical and/or electrical survey equipment including; measuring tapes and chains, levels, inclinometer, measuring wheels and integrated survey stations.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification

RANGE STATEMENT

- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTD RDS33A Draft and layout a power system street lighting system

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the planning and layout of street lighting systems. It includes the conduction of site inspections to confirm and or modify a street lighting system layout, estimation of costs and resources for the works order and the pegging out of the poles/underground cables according to the work order and to optimise visibility and minimise traffic hazards. It also encompasses the provision of advice on conditions of supply and permits and the communication and coordination needed to be undertaken with the relevant authorities and clients.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice**3)**

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits

Prerequisite Unit(s) 4)

UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus
UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to draft and layout a street lighting system	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained and analysed, if necessary, by site inspection and the extent of the work determined for planning and coordination.</p> <p>1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.</p> <p>1.3 Risk control measures are identified, prioritised and evaluated against the work schedule.</p> <p>1.4 Relevant requirements and established procedures for the work are to all personnel and identified for all work sites.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.</p> <p>1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.</p>

ELEMENT**PERFORMANCE CRITERIA**

- | | |
|------|--|
| 1.8 | Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements. |
| 1.9 | Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work. |
| 1.10 | Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures. |
| 1.11 | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures. |
| 1.12 | Positioning of road signs, barriers and warning devices is planned in accordance with requirements. |
| 2 | Carry out the drafting and layout of a street lighting system |
| 2.1 | OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures. |
| 2.2 | First Aid, Pole Top Rescue and other related work procedures are performed according to requirements and/or established procedures. |
| 2.3 | Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements. |
| 2.4 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| 2.5 | Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established |

ELEMENT	PERFORMANCE CRITERIA
	procedures.
	2.6 The drafting and layout of a street lighting system are carried out, in accordance with the work schedule and requirements and/or established procedures.
	2.7 Essential knowledge and associated skills are applied in the safe drafting and layout of a street lighting system to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
3 Complete the drafting and layout of a street lighting system	3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
	3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and are returned to service and advised to client/customer in accordance with requirements.
	3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of drafting and laying out a street lighting system.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS33A Power system street lighting system

Evidence shall show an understanding of the power system street lighting system to an extent indicated by the following aspects: Draft and layout a power system street lighting system

T1 Installation of overhead distribution conductors encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length.
- Constructions types and structures for distribution and sub transmission lines
- Types, sizes and characterises of overhead conductors
- Resources for the stringing and maintenance of conductors - types of low and high voltage overhead electrical conductor connections, causes and effects of poor electrical connections, reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors, minimum clearances between overhead conductors and low and high voltage structures.
- Techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of low and high voltage conductors.

T2 Installation of poles and or structures and hardware encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing poles and associated hardware
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - characteristics and applications of different types of poles and associated hardware
- Techniques for installing poles and associated hardware - types of installation equipment/tools, excavation methods, types of footings/foundations, types of attachments, earthing systems, clearances between conductors, safe methods of erecting and stabling poles and or structures and cross arms.
- Techniques for maintenance of poles and associated hardware - stabilisation techniques for unstable poles, methods of strengthen poles, maintenance and replacement of high voltage insulators and cross arms.

T3 Procedures for installation and maintenance on public lighting structures and

REQUIRED SKILLS AND KNOWLEDGE

associated equipment encompassing:

- Standards, codes, legislation, supply authority regulations, local government and or enterprise requirements pertaining to the installation and maintenance of public lighting systems and associated equipment
- Safety precautions specific to working on street lighting - safe working practices and procedures, safe clearances from LV and HV mains, working at heights, working in confined spaces, permit to work systems and isolation procedures, emergency response and rescue including First Aid etc.
- Basic public lighting principles - electromagnetic spectrum, principles of colour, behaviour of light, factors that affect illumination.
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - street lighting circuits, earthing system
- Types of tools and equipment used for installation and maintenance
- Types and function of lanterns/Luminaires/lamps, control equipment, poles and associated hardware used for street lighting - HP mercury vapour, LP and HP sodium vapour, fluorescent, quartz-halogen, wood, concrete, steel, composite, choke boxes, photo-electric cells, time switches, contactor boxes
- Types of lighting systems - overhead and underground street lighting systems, controlling and switching of lighting systems.
- Techniques for the installation of street lighting systems
- Techniques for the maintenance of street lighting systems - diagnosing of faults, removing, repairing, replacement and cleaning of public lighting and associated hardware.
- Application of specific testing equipment - voltage detectors, insulation resistance testers, clamp-on ammeters, continuity testers, fault indicators
- Techniques for the inspection, testing and commissioning of street lighting systems

T4 Different types and function of distribution components encompassing:

- Commonwealth/State/Territory and local government legislation, Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of distribution components
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
- Types, function and characteristics of distribution components
- Safety policies and procedures precautions related to the handling and installing distribution components

T5 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.

REQUIRED SKILLS AND KNOWLEDGE

- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams.

T6 Power distribution network documentation encompassing:

- Requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, instruction/worksheets sheets.
- Interpretation of different diagrams and documentation on LV and HV systems - overhead distribution extensions, underground distribution extensions, distribution substation, street lighting system.

T7 Layout principles for overhead distribution encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to overhead distribution layout
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components such as equipment, poles, cross-arms, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards, minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length -
- Resources needed for the stringing and maintenance of conductors
- Types of low LV and HV overhead electrical conductor connections
- Minimum clearances between overhead conductors and low LV and/HV structures
- Estimation of the duration of overhead distribution extension project

T8 Fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply and aviation authority regulations and or enterprise requirements applicable to the surveying for an overhead and underground extension
- Techniques in measuring heights and distances
- Techniques in taking bearings angles of deviation using a compass
- Techniques in using a clinometer
- Techniques in recording and storage of data
- Requirements for the use of overhead line construction manuals, system

REQUIRED SKILLS AND KNOWLEDGE

diagrams/plans and drawings

- Techniques in plotting long spans - measuring stick, clinometer, trundle wheel, tapes, correction for sloping ground, distance across objects and range rods
- Techniques in pegging pole positions - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs

T9 Fundamentals of computer aided drafting (CAD) for drafting and layout of distribution extension and upgrades encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the drafting and layouts of distribution extensions and upgrades
- Types of computer hardware and software, tools and equipment for the production of a draft and layout of distribution extension and or upgrade
- Techniques in storing and retrieving programs and files from the computer
- Identification and methods of retrieving and manipulating, digital symbols, designs, layouts, fonts and graphs stored in the computer
- Techniques in using the CAD package in following necessary commands and protocols in accordance with the operating instructions of the CAD software manufacturer
- Note: Examples include using file structure, menu utilisation, system library usage, data banking, achieving, file management and maintenance procedures
- Calculation of dimensions and drafting measurements using the computer
- Techniques in the preparation of preliminary sketches using the computer
- Techniques in using 2D computer graphics system and associated equipment to produce a distribution extension and or upgrade draft or layout
- Techniques to diagnosing basic faults in computer operation

T10 Principles to light design layout encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the light design principles
- Requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types of tariffs and charges
- Types of street lighting components - column types, foundations, brackets, luminaries and mounting heights
- Types of electrical street lighting circuits - types of supply, lighting circuit and control circuit
- Fundamentals of lighting production - electromagnetic spectrum, visible and non-visible radiation, spectral energy distribution, infra-red, ultra-violet, radiation-safety, incandescence and phosphorescence, reflection and refraction.
- Fundamentals of lighting concepts - terms and units, purpose of reflectors and diffusers.

REQUIRED SKILLS AND KNOWLEDGE

- Factors affecting external lighting design
- Calculation of light output
- Determining illuminance - point to point method, lumen method
- Determining rated life of luminaires
- Fundamentals of street lighting design
- Considerations for special lighting situations - security lighting, hazardous street locations, and emergency lighting.

T11 Principles to layout and draft a street lighting system encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to street lighting system layouts and drafts
- Requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components such as equipment, poles, cross-arms, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length
- Determination of street lighting positions for optimum visibility and minimise traffic hazards
- Techniques in mounting and position of lights
- Resources needed for the installation of street lighting system
- Methods of pegging out of pole positions and/or underground cable positions
- Minimum clearances between overhead conductors and low LV/and HV structures
- Estimation of the duration of overhead distribution extension project.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	Production of preliminary plan for a street lighting system Production of a layout of a street lighting system.
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual drafting and layout of a street lighting system.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the draft and layout of a street lighting systems and may include the following equipment:

Pole (including wood, concrete, steel and composite) associated hardware including conductors (underground, bare wire and aerial bundle cable), LV Switchgear, lanterns, lamps, brackets, signage, supervisory cable, cable TV, Substations, relevant protection systems and associated civil works.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS34A Draft and layout a power system distribution substation minor upgrade

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the drafting and laying out of minor LV distribution substation upgrades, including the estimating of the costs and/or resources for the work to be undertaken. It also encompasses on-the-job design, surveying techniques, the pegging and/or marking out of the trench position, the pit/pillar position and the cable position according to the work order and enterprise requirements.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETTDREL11A	Apply sustainable energy and environmental procedures

Prerequisite Unit(s) 4)

UETTDREL16A	Working safely near live electrical apparatus
UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to draft and layout a distribution substation upgrade	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained and analysed, if necessary, by site inspection and the extent of the work determined for planning and coordination.
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.4 Relevant requirements and established procedures for the work are to all personnel and identified for all work sites.
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and

ELEMENT	PERFORMANCE CRITERIA
	technical working order.
	1.8 Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
	1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.12 Positioning of road signs, barriers and warning devices is planned in accordance with requirements.
2 Carry out the drafting and layout of a distribution substation upgrade	2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
	2.2 First Aid, Pole Top Rescue and other related work procedures are performed according to requirements and/or established procedures.
	2.3 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.
	2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.

ELEMENT

PERFORMANCE CRITERIA

- 2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
- 2.6 Drafting and layout of a distribution substation upgrade is carried out, in accordance with the work schedule and requirements and/or established procedures.
- 2.7 Essential knowledge and associated skills are applied in the safe drafting and layout of a distribution substation upgrade to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
- 2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
- 3 Complete the drafting and layout of a distribution substation upgrade
 - 3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
 - 3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
 - 3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
 - 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
 - 3.5 Relevant work permit(s) are signed off and,

ELEMENT

PERFORMANCE CRITERIA

substation equipment, apparatus, wiring and instrumentation are returned to service and advised to client/customer in accordance with requirements.

3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of drafting and laying out a distribution substation minor upgrade.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS34A Power system distribution substation minor upgrade

Evidence shall show an understanding of the power system distribution substation minor upgrade to an extent indicated by the following aspects:

T1 Installation of overhead distribution conductors encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length.
- Constructions types and structures for distribution and sub transmission lines
- Types, sizes and characterises of overhead conductors
- Resources for the stringing and maintenance of conductors - types of low and high voltage overhead electrical conductor connections, causes and effects of poor electrical connections, reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors, minimum clearances between overhead conductors and low and high voltage structures.
- Techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of low and high voltage conductors.

T2 Installation of underground cable encompassing:

- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Safety precautions specific to the installation of underground cable - excavation and trench safety regulations, gas detection procedures, working in confined spaces, personal protective equipment, hazards for the use of LPG equipment for jointing of underground cable, gas bottle testing procedures, permit to work systems and isolation procedures.
- Trench excavation and reinstatement procedures
- Installation of underground cable procedures - types of tools and equipment, methods of installing conduits, methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)
- Procedures for the safe use of LPG equipment for cable jointing.

T3 Construction and types of underground cables encompassing:

- Safety precautions specific to handling underground cables

REQUIRED SKILLS AND KNOWLEDGE

- Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- Types and applications of UC
- Construction types and structures of underground cables
- Characteristics of different types of underground cables
- Ratings

T4 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams.

T5 Power distribution network documentation encompassing:

- Requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, instruction/worksheets sheets.
- Interpretation of different diagrams and documentation on LV and HV systems - overhead distribution extensions, underground distribution extensions, distribution substation, street lighting system.

T6 Fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply and aviation authority regulations and or enterprise requirements applicable to the surveying for an overhead and underground extension
- Techniques in measuring heights and distances
- Techniques in taking bearings angles of deviation using a compass
- Techniques in using a clinometer
- Techniques in recording and storage of data
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
- Techniques in plotting long spans - measuring stick, clinometer, trundle wheel, tapes, correction for sloping ground, distance across objects and range rods
- Techniques in pegging pole positions - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs

REQUIRED SKILLS AND KNOWLEDGE

T7 Fundamentals of computer aided drafting (CAD) for drafting and layout of distribution extension and upgrades encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the drafting and layouts of distribution extensions and upgrades
- Types of computer hardware and software, tools and equipment for the production of a draft and layout of distribution extension and or upgrade
- Techniques in storing and retrieving programs and files from the computer
- Identification and methods of retrieving and manipulating, digital symbols, designs, layouts, fonts and graphs stored in the computer
- Techniques in using the CAD package in following necessary commands and protocols in accordance with the operating instructions of the CAD software manufacturer
- Note: Examples include using file structure, menu utilisation, system library usage, data banking, achieving, file management and maintenance procedures
- Calculation of dimensions and drafting measurements using the computer
- Techniques in the preparation of preliminary sketches using the computer
- Techniques in using 2D computer graphics system and associated equipment to produce a distribution extension and or upgrade draft or layout
- Techniques to diagnosing basic faults in computer operation

T8 Layout principles for underground mains distribution extension encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to underground mains distribution extension
- Requirements for the use of underground mains construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components and equipment, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards, minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length
- Resources needed for the laying of conductors
- Determining the appropriate excavation for the location
- Determining the size and depth of excavation
- Determining the trench and pit layout procedures
- Minimum clearances between conductors
- Estimation of the duration of underground distribution extension project

T9 Layout principles for a distribution substation minor upgrade encompassing:

- Commonwealth, State/Territory and local government legislation, Standards,

REQUIRED SKILLS AND KNOWLEDGE

codes, supply authority regulations and or enterprise requirements applicable to a distribution substation minor upgrade

- Requirements for the use of distribution substation minor upgrade construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components and equipment, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards, minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length
- Resources needed for the laying of conductors, cables and equipment
- Determining the appropriate installation sequence
- Minimum clearances between conductors and equipment
- Estimation of the duration of underground distribution extension project.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord

with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as

- specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least one of the following:	Produce a multi-phase pole mounted distribution transformer upgrade plan/layout Produce an single-phase pole mounted transformer upgrade plan/layout
B	At least one of the following:	Layout an multi-phase underground distribution substation upgrade Layout a multi-phase distribution substation or associated equipment upgrade e.g. Substations, transformers, HV/LV switchgear etc.
C	At least one occasion	Dealing with an unplanned event by

		drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual drafting and layout of a distribution substation upgrade.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the draft and layout of a minor distribution substation upgrade and may include the following equipment:

Substations, transformers, cables, Surge Div, HV Switchgear, LV Switchgear, links, relays, power supply, signage, busbars, relevant protection systems including fuses and circuit breakers and associated civil works.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS35A Design overhead distribution power systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the technical design of overhead distribution and sub transmission networks to relevant standards, including electrical clearances, electrical and mechanical loadings, earthing, environmental considerations, minor civil aspects and the handling of waterway, railway and other crossings. It also includes the necessary established procedures to ensure the line design conforms to specific organisational technical standards, operational and system planning requirements and incorporates the principles of safe design.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice**3)**

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic engineering computational problems

Prerequisite Unit(s)	4)	
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDNIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDNIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
		Pathway Unit Group 1
	UETTDARDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure
	UETTDARDS45A	Organise and implement ESI line and easement surveys
		Pathway Unit Group 2
	UETTDARDS43A	Develop high voltage and low voltage distribution protection systems

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in

Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Plan for and coordinate the safe design of overhead distribution systems	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of overhead distribution systems, are reviewed and determined.
		1.2	Purpose of the design is established and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures, policies and specifications for the design are obtained or established with the appropriate personnel.
		1.4	Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established

ELEMENT**PERFORMANCE CRITERIA**

		procedures.
	1.5	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.8	Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
2	Carry out and coordinate the safe design of overhead distribution systems	
	2.1	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2	OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4	Mathematical models of the distribution system are used to analyse the effectiveness of the finished project as per requirements and

ELEMENT	PERFORMANCE CRITERIA
3 Complete and coordinate the safe design of overhead distribution systems	established procedures.
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
	3.1 Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentation needed to complete the design brief.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
	3.4 Approved copies of design documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing overhead distribution systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS35A Power system overhead distribution - design

Evidence shall show an understanding of the designing of overhead distribution power systems to an extent indicated by the following aspects:

T1 Mathematics techniques encompassing:

- Calculations involving fractions, decimals, ratios, proportions
- Calculations involving area, volume, mass and density
- Calculations involving transposition and substitution of formulae
- Calculations involving simple trigonometric problems.

T2 Engineering mechanics encompassing:

- Identification of basic concepts, principles and applications - Application of velocity, acceleration, force, density, torque, and pressure
- Applications of the SI units
- The relationship between work, power and energy
- Behavior of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- Fundamentals of the basic laws of fluid mechanics.

T3 Materials properties encompassing:

- Identification and classification of engineering materials material properties
- Types and applications - properties of tensile strength, effects of temperature on the expansion of metals, ductibility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers.

T4 Installation of overhead distribution conductors encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length.
- Constructions types and structures for distribution and sub transmission lines
- Types, sizes and characterises of overhead conductors
- Resources for the stringing and maintenance of conductors - types of low and high voltage overhead electrical conductor connections, causes and effects of poor

REQUIRED SKILLS AND KNOWLEDGE

electrical connections, reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors, minimum clearances between overhead conductors and low and high voltage structures.

- Techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of low and high voltage conductors.

T5 Installation of poles and or structures and hardware encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing poles and associated hardware
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - characteristics and applications of different types of poles and associated hardware
- Techniques for installing poles and associated hardware - types of installation equipment/tools, excavation methods, types of footings/foundations, types of attachments, earthing systems, clearances between conductors, safe methods of erecting and stabling poles and or structures and cross arms.
- Techniques for maintenance of poles and associated hardware - stabilisation techniques for unstable poles, methods of strengthen poles, maintenance and replacement of high voltage insulators and cross arms.

T6 Installation of metering and control equipment encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
- Types of meters - kilowatt-hour meters single and polyphase, demand meters, recording meters and electronic recording metering systems summators
- Installation and removal methods - direct connection and plug in method, enterprise specific
- Types of associated equipment and accessories - meter boards, service fuse, links, contactors, time switch, audio frequency injection relay
- Testing procedures - safety testing, polarity testing

T7 Different types and function of distribution components encompassing:

- Commonwealth/State/Territory and local government legislation, Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of distribution components
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
- Types, function and characteristics of distribution components
- Safety policies and procedures precautions related to the handling and installing distribution components

T8 Principles of Statutory and safety considerations encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T9 High voltage SWER system encompassing:

- Application and function of SWER system components
- Circuit arrangement
- Principle of operation
- Hazards and procedures associated with faulty SWER earth systems
- Procedure to isolate, energise and commission SWER substations

T10 Power distribution network documentation encompassing:

- Requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, instruction/worksheets sheets.
- Interpretation of different diagrams and documentation on LV and HV systems - overhead distribution extensions, underground distribution extensions, distribution substation, street lighting system.

T11 Layout principles for overhead distribution encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to overhead distribution layout
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components such as equipment, poles, cross-arms, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards, minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length -
- Resources needed for the stringing and maintenance of conductors
- Types of low LV and HV overhead electrical conductor connections
- Minimum clearances between overhead conductors and low LV and/HV structures
- Estimation of the duration of overhead distribution extension project

T12 System components and layouts encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Distribution system layouts - overhead/underground, urban/rural, HV customers, high rise building systems, three phase lines, single phase lines, SWER systems, spur, parallel and ring systems, typical substation types.
- Transmission system layouts - lines, buses, transformers and cables, line/bus layouts including single, double, ring and breaker and half systems, HV crossing methods.

T13 AC transmission system components encompassing:

- Support structures and reasons for selection
- Insulators and reasons for selection
- Conductors and reasons for selection
- Vibration management systems and principles
- Line ratings based on voltage, span, tension and temperature

T14 AC transmission line electrical parameters encompassing:

- Typical arrangements
- Parameters of significance
- Calculation of line parameters - Calculation of resistive, inductive and capacitive values assuming regular transposition and solid conductors
- Comparison with actual values
- Typical parameter values and ratios for different voltage level lines.

T15 AC transmission line models encompassing:

- Types of transmission line models based on line length
- Calculation of voltage drop, line regulation, and transmission efficiency
- Load sharing between lines.

T16 Basic design features and characteristics of poles/structures and associated equipment and or components encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing of poles/structures and associated equipment and or components
- Distribution systems principles – terminologies, primary and secondary, voltage levels, supply quality, load curve profiles (residential/industrial/commercial), types of feeders, urban and rural single-phase systems, SWER
- Characteristics of poles - types of poles (wood, concrete and steel), installation methods of poles (tooling, rake, life, labelling, sinking), maintenance techniques of poles - above and below ground pole strength and loads.
- Characteristics of associated equipment used on poles and structures - crossarms (types and standard sizes), insulators.

T17 Basic design features and characteristics of underground cables, lines, poles/structures and associated equipment and or components encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment

REQUIRED SKILLS AND KNOWLEDGE

- Overhead lines characteristics - type of components, characteristics of conductor material, mechanical limitations and physical dimensions of lines, current rating factors (heating, voltage drops, power losses) of conductors, aerial bundled cables (HV and LV), covered conductors.
- Characteristics and constructional features of poles and structures - types of poles and structures, characteristics of poles/structure materials, mechanical limitations of poles/structures, footings and additional support techniques.
- Characteristics and constructional features of underground cables - underground cables constructional features, insulation materials and abbreviations, cable dielectrics, electric stress, cable voltage drop.
- Calculation of cable volt drop in relation to length of cable run
- Techniques in reducing electrical stress on cables
- Cable rating factors
- Methods of joining and terminating cables
- Techniques in the installation of cables above and below ground
- Techniques in cable testing and the location of cable faults
- Techniques in cable drawing.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is

recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and

- range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Completion of six (6) compliant technical designs of an overhead distribution or sub transmission system with at least one relating to each of the following project types:	Multi-pole extensions In-line pole relocations Multi-circuit overhead lines
B	Designs should also include all of the following:	Activities that address the correction of errors in the process. Application of a design control checklist which lists all of the required design activities to be carried out in this process.

C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual safe design of overhead distribution systems.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design of overhead distribution systems using safe design, engineering principles and schedules and may include the following equipment:

Pole (including wood, concrete, steel and composite) associated hardware including conductors (bare wire and covered), crossarms, insulators, stays, ACR, regulator, earthing, air break switches, gas switches, capacitor units, transformers, links, fuses, sectionalisers, surge arrestors, HV switchgear, LV switchgear, control boxes, communications equipment, luminaires/lanterns, signage, supervisory cable, cable TV, substations, relevant protection systems and associated civil works.

May include computer based drafting and design technologies.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS

RANGE STATEMENT

- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS36A Design underground distribution power systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the technical design of underground distribution and sub transmission networks to relevant standards, including cable sizing and locations, soil resistivity and heat dissipation, backfill and trenching details, minor civil aspects and dynamic and cyclic ratings. It also includes the necessary established procedures to ensure the line design conforms to specific organisational technical standards, operational and system planning requirements and encompasses the principles of safe design.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice**3)**

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic engineering computational problems
UEENEEG101A	Solve problems in electromagnetic

Prerequisite Unit(s)	4)	
		devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	Pathway Unit Group 1	
	UETTD RDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure
	UETTD RDS45A	Organise and implement ESI line and easement surveys
	Pathway Unit Group 2	
	UETTD RDS43A	Develop high voltage and low voltage distribution protection systems

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for and coordinate the safe design of underground distribution systems	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of underground distribution systems, are reviewed and determined.
		1.2	Purpose of the design is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures or policies and specifications for the design are obtained or established with the appropriate personnel.
		1.4	Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established

ELEMENT	PERFORMANCE CRITERIA
	procedures.
	1.5 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
2 Carry out and coordinate the design of underground distribution systems	<p>2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.</p> <p>2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.</p> <p>2.3 System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.</p> <p>2.4 Mathematical models for the design of the underground distribution system are used to analyse the effectiveness of the finished project</p>

ELEMENT**PERFORMANCE CRITERIA**

- as per requirements and established procedures.
- 2.5 Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 3 Complete and coordinate the design of underground distribution systems
- 3.1 Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of design documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing underground distribution systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS36A Design underground distribution power systems

Evidence shall show an understanding of the designing of underground distribution power systems to an extent indicated by the following aspects:

T1 Mathematics techniques encompassing:

- Calculations involving fractions, decimals, ratios, proportions
- Calculations involving area, volume, mass and density
- Calculations involving transposition and substitution of formulae
- Calculations involving simple trigonometric problems.

T2 Engineering mechanics encompassing:

- Identification of basic concepts, principles and applications - Application of velocity, acceleration, force, density, torque, and pressure
- Applications of the SI units
- The relationship between work, power and energy
- Behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- Fundamentals of the basic laws of fluid mechanics.

T3 Evidence shall show an understanding of materials properties encompassing:

- Identification and classification of engineering materials material properties
- Types and applications - properties of tensile strength, effects of temperature on the expansion of metals, ductility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers.

T4 Installation of underground cable encompassing:

- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Safety precautions specific to the installation of underground cable - excavation and trench safety regulations, gas detection procedures, working in confined spaces, personal protective equipment, hazards for the use of LPG equipment for jointing of underground cable, gas bottle testing procedures, permit to work systems and isolation procedures.
- Trench excavation and reinstatement procedures
- Installation of underground cable procedures - types of tools and equipment,

REQUIRED SKILLS AND KNOWLEDGE

methods of installing conduits, methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)

- Procedures for the safe use of LPG equipment for cable jointing.

T5 Construction and types of underground cables encompassing:

- Safety precautions specific to handling underground cables
- Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- Types and applications of UC
- Construction types and structures of underground cables
- Characteristics of different types of underground cables
- Ratings

T6 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T7 The implementation and monitoring requirements for the impact of powerline installations and operation on the environment and/or the area surrounding the powerline and/or equipment encompassing:

- Identification of relevant legislation, codes and government guidelines for the implementation and monitoring of environmental impact factors in the workplace and areas of power distribution or transmission - Commonwealth/State/Territory legislation relevant to the workplace and the Environment Protection Act legislation and common law
- Identification, assessment, control and monitoring of the hazards to the environment associated with the Powerline industry
- Workplace environment quality standards enterprise plan - setting of acceptable emission level limits from power plant equipment, impact of the enterprise activities on air and water quality, nature, impact and level of emissions from power plant, power distribution and transmission equipment and network infrastructure (noise generation, noxious gas emissions, greenhouse gas production, electromagnetic emissions, electromagnetic field strength, oil leakage, insulation breakdown products)
- Provision of manufacturers and suppliers information such as material safety data sheets (MSDSs)
- Gathering of environment management information
- Maintenance of environmental records
- Risk assessment and its management in Powerline industry
- Maintenance strategies for environment protection programs - developing processes for promoting, maintaining and improving environmental impact in the

REQUIRED SKILLS AND KNOWLEDGE

workplace and identify techniques for the evaluating and reviewing environment protection education and training programs and elements of an effective environment protection management system, EPA consultation and accident/incident investigations.

T8 Layout principles for underground mains distribution extension encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to underground mains distribution extension
- Requirements for the use of underground mains construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components and equipment, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards, minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length
- Resources needed for the laying of conductors
- Determining the appropriate excavation for the location
- Determining the size and depth of excavation
- Determining the trench and pit layout procedures
- Minimum clearances between conductors
- Estimation of the duration of underground distribution extension project

T9 System components and layouts encompassing:

- Distribution system layouts - overhead/underground, urban/rural, HV customers, high rise building systems, three phase lines, single phase lines, SWER systems, spur, parallel and ring systems, typical substation types.
- Transmission system layouts - lines, buses, transformers and cables, line/bus layouts including single, double, ring and breaker and half systems, HV crossing methods.

T10 Basic design features and characteristics of underground cables, lines, poles/structures and associated equipment and or components encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment
- Overhead lines characteristics - type of components, characteristics of conductor material, mechanical limitations and physical dimensions of lines, current rating factors (heating, voltage drops, power losses) of conductors, aerial bundled cables (HV and LV), covered conductors.
- Characteristics and constructional features of poles and structures - types of poles and structures, characteristics of poles/structure materials, mechanical limitations of poles/structures, footings and additional support techniques.
- Characteristics and constructional features of underground cables - underground

REQUIRED SKILLS AND KNOWLEDGE

cables constructional features, insulation materials and abbreviations, cable dielectrics, electric stress, cable voltage drop.

- Calculation of cable volt drop in relation to length of cable run
- Techniques in reducing electrical stress on cables
- Cable rating factors
- Methods of joining and terminating cables
- Techniques in the installation of cables above and below ground
- Techniques in cable testing and the location of cable faults
- Techniques in cable drawing.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being

assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated

- environment; and
- Demonstrate an appropriate level of employability skills; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Completion of six (6) technical designs of an underground distribution or sub transmission network relating to the following project types:	Residential Subdivision Developments Industrial/Commercial Subdivision Developments Alteration to existing assets Underground supplies to single customers including projects requiring substations.
B	Designs should also included all the following:	Activities that address the correction of errors in the process. Application of a design control checklist which lists all of the required design activities to be carried out in this process.
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate

		solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake the design of underground distribution systems.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in a realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design of underground distribution systems and may include the following equipment:

Underground cable, terminations, joints, Substations, mechanical protection, HV Switchgear, LV Switchgear, signage, relevant protection systems, relevant protection systems including fuses and circuit breakers and associated civil works.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS37A Design power system distribution substations

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the technical design of distribution substations to relevant standards and specifications, including earthing, location of substation relevant to load, customer and environmental needs and minor civil aspects. It also includes the necessary established procedures to ensure the substation design conforms to specific organisational technical standards operational and system planning requirements and encompasses the principles of safe design.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice**3)**

safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic engineering computational problems
UEENEEG101A	Solve problems in electromagnetic devices and related circuits

Prerequisite Unit(s)**4)**

UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus
UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
Pathway Unit Group 1	
UETTD RDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure
UETTD RDS45A	Organise and implement ESI line and easement surveys
Pathway Unit Group 2	
UETTD RDS43A	Develop high voltage and low voltage distribution protection systems

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for and coordinate the safe design of distribution substations	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of distribution substations, are reviewed and determined.
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Organisational established procedures on policies and specifications for the design are obtained or established with the appropriate personnel.
	1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures.

ELEMENT	PERFORMANCE CRITERIA
1.5	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
1.6	Risk control measures are identified, prioritised and evaluated against the work schedule.
1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
1.8	Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
2 Carry out and coordinate the design of distribution substations	<p>2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.</p> <p>2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.</p> <p>2.3 System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.</p> <p>2.4 Mathematical models of the distribution system are used to analyse the effectiveness of the finish project as per requirements and established procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
	2.5 Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
3 Complete and coordinate the design of distribution substations	3.1 Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
	3.4 Approved copies of design documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing distribution substations.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS37A Design power system distribution substations

Evidence shall show an understanding of the designing of power system distribution substations to an extent indicated by the following aspects:

T1 Mathematics techniques encompassing:

- Calculations involving fractions, decimals, ratios, proportions
- Calculations involving area, volume, mass and density
- Calculations involving transposition and substitution of formulae
- Calculations involving simple trigonometric problems.

T2 Engineering mechanics encompassing:

- Identification of basic concepts, principles and applications - Application of velocity, acceleration, force, density, torque, and pressure
- Applications of the SI units
- The relationship between work, power and energy
- Behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- Fundamentals of the basic laws of fluid mechanics.

T3 Materials properties encompassing:

- Identification and classification of engineering materials material properties
- Types and applications - properties of tensile strength, effects of temperature on the expansion of metals, ductility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers.

T4 Generation systems encompassing:

- Methods of generating electricity - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
- Relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
- The purpose and features of typical types of co-generation systems.

T5 Substations and power transformers encompassing:

- Relationship between the substations within an overall power system: note

REQUIRED SKILLS AND KNOWLEDGE

examples include purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment

- Characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling
- Auxiliary equipment used on transformers - function and basic operation
- Maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault finding procedures
- Characteristics of a reactors - description and purpose

T6 The installation of metering and control equipment encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
- Types of meters: note examples include kilowatt-hour meters single and polyphase, demand meters, recording meters and electronic recording metering systems summators
- Installation and removal methods - direct connection and plug in method and enterprise specific
- Types of associated equipment and accessories - meter boards, service fuse, links, contactors, time switch, audio frequency injection relay
- Testing procedures - safety and polarity testing

T7 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T8 The installation of switchgear and associated equipment encompassing:

- Types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques
- Types of equipment: note examples include transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- Installation procedures for switchgear and equipment encompassing: standards, codes, legislation, supply authority regulations and or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques and pole mounted locations
- Maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry standards and procedures

REQUIRED SKILLS AND KNOWLEDGE

- Testing and commissioning - electricity supply industry standards and procedures

T9 High voltage distribution transformer principles encompassing:

- Operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer — cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution transformer and associated electrical apparatus faults
- HV underground switching equipment - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers

T10 Feeder automation system encompassing:

- Function of feeder automation system and the main components
- Operation procedure for a remote field device from a local control station
- Functions of “System Control and Data Acquisition” (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components
- SCADA system security interlocks and access restrictions
- SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciated System and Local Control Station
- Function of the main components of a local/remote control system
- Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciated System and Local Control Station

T11 Environmental fundamentals encompassing:

- Environmental standards, codes, environmental legislation, supply authority regulations and or enterprise requirements applicable to the control of environment associated with the worksite encompassing, relevant federal legislation, relevant state/territory legislation, relevant local government by-laws, relevant government or quasi government policies and regulations and relevant community planning and development agreements - land care agreements.
- Employer and employee responsibilities
- Methods of obtaining information on environmental issues and updates
- Methods of identifying environmental impacts from work related activities
- Meaning of environmental terms encompassing identification, assessment and control of risks, compliance and best practice and sustainable energy
- Procedures in implementing management plans to ensure compliance

T12 Layout principles for a distribution substation minor upgrade encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to a distribution substation minor upgrade

REQUIRED SKILLS AND KNOWLEDGE

- Requirements for the use of distribution substation minor upgrade construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components and equipment, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards, minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length
- Resources needed for the laying of conductors, cables and equipment
- Determining the appropriate installation sequence
- Minimum clearances between conductors and equipment
- Estimation of the duration of underground distribution extension project

T13 Fundamentals of distribution transformers encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the safe operation and testing of distribution transformers and auxiliary equipment
- Drawing layouts, conventions and symbols, note: examples include vector group of transformers and three phase transformers
- Construction of a distribution transformer
- Characteristics when operated under load and no load conditions
- Percentage impedance determinations by test and calculation
- Function and operation of tap charging switches including solid state tap changing equipment
- Function and operation of transformer auxiliary equipment
- Problems caused by harmonics in transformers
- Methods and equipment used to overcome harmonics in transformers

T14 Testing procedures of distribution transformers encompassing:

- Safety precautions specific to the testing of distribution transformers
- Procedures for safely connecting distribution transformers for testing
- Testing of distribution transformers to determine losses
- Calculation of transformer's efficiency
- Methods and types of equipment used to cool transformers encompassing: properties of transformer oil and tests performed on transformer oil
- Techniques in performing selected tests on transformer oil
- Techniques in performing testing procedures on armer
- Techniques in testing distribution transformers
- Distribution transformer parallel connections - conditions and restrictions for parallel operations
- Calculations of loading on transformers operating in parallel
- Connection of transformer in parallel to supply a common load

REQUIRED SKILLS AND KNOWLEDGE

T15 Distribution earthing system encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to the distribution earthing system
- Reason and types of distribution earthing systems
- Terminologies used in the earth systems including, touch and step potential
- Conditions associated when an active HV conductor fails to earth
- Selection of earthing electrodes and grids
- Determination of the earthing resistance of copper clad rods using earthing monograms

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being

assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated

- environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Completion of six (6) technical designs of a Distribution Substation relating to at least two of the following project types:	Multi-transformer substations Residential developments Industrial/commercial developments Alteration to existing assets
B	Designs should also include all the following:	Activities that address the correction of errors in the process. Application of a design control checklist, which lists all of the required design activities to be carried out in this process.
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the

		above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual design of distribution substations

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design of distribution substations and may include the following equipment:

Substations, transformers, cables, Surge Div, HV Switchgear, LV Switchgear, links, relays, power supply, signage, busbars, relevant protection systems including fuses and circuit breakers and associated civil works.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS38A Design power system public lighting systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the technical design of public lighting systems. This includes pedestrian and traffic route lighting to relevant Australian standards utilising appropriate software to generate design conformance.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of

License to practice **3)**
operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic engineering computational problems
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits

Prerequisite Unit(s)**4)**

UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus
UETTD R IS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD R IS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Pathway Unit Group 1

UETTD R DS39A	Prepare and manage detailed construction plans for electrical power system infrastructure
UETTD R DS45A	Organise and implement ESI line and easement surveys

Pathway Unit Group 2

UETTD R DS43A	Develop high voltage and low voltage distribution protection systems
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Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for and coordinate the safe design of public lighting systems	1.1	OHS practices/procedures and environmental and sustainable energy procedures which may influence the design of public lighting systems are reviewed and determined.
		1.2	Purpose of the design is established and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the design are obtained or established with the appropriate personnel.
		1.4	Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures.
		1.5	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and

ELEMENT**PERFORMANCE CRITERIA**

- in accordance with established procedures.
- 1.6 Risk control measures are identified, prioritised and evaluated against the work schedule.
- 1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 1.8 Resources including personal, equipment, tools and personnel protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
- 2 Carry out and coordinate the design of public lighting systems
- 2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
- 2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
- 2.3 System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
- 2.4 Mathematical models of the distribution system are used to analyse the effectiveness of the finish project as per requirements and established

ELEMENT**PERFORMANCE CRITERIA**

		procedures.
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
3	Complete and coordinate the design of public lighting systems	<p>3.1 Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of design documents are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing public lighting systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS38A Design power system public lighting systems

Evidence shall show an understanding of the designing of power system public lighting systems to an extent indicated by the following aspects:

T1 Mathematics techniques encompassing:

- Calculations involving fractions, decimals, ratios, proportions
- Calculations involving area, volume, mass and density
- Calculations involving transposition and substitution of formulae
- Calculations involving simple trigonometric problems.

T2 Engineering mechanics encompassing:

- Identification of basic concepts, principles and applications - application of velocity, acceleration, force, density, torque, and pressure
- Applications of the SI units
- The relationship between work, power and energy
- Behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- Fundamentals of the basic laws of fluid mechanics.

T3 Materials properties encompassing:

- Identification and classification of engineering materials material properties
- Types and applications - properties of tensile strength, effects of temperature on the expansion of metals, ductility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers.

T4 Evidence shall show an understanding of transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps

REQUIRED SKILLS AND KNOWLEDGE

for planning and installing an overhead and underground distribution system

- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T5 Procedures for installation and maintenance on public lighting structures and associated equipment encompassing:

- Standards, codes, legislation, supply authority regulations, local government and or enterprise requirements pertaining to the installation and maintenance of public lighting systems and associated equipment
- Safety precautions specific to working on street lighting encompassing: safe working practices and procedures, safe clearances from LV and HV mains, working at heights, working in confined spaces, permit to work systems and isolation procedures and emergency response and rescue including First Aid etc
- Basic public lighting principles - electromagnetic spectrum, principles of colour, behaviour of light, factors that affect illumination
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - street lighting circuits and earthing system
- Types of tools and equipment used for installation and maintenance
- Types and function of lanterns/Luminaires/lamps, control equipment, poles and associated hardware used for street lighting - HP mercury vapour, LP and HP sodium vapour, fluorescent, quartz-halogen, wood, concrete, steel, composite, choke boxes, photo-electric cells, time switches, contactor boxes
- Types of lighting systems - overhead and underground street lighting systems and controlling and switching of lighting systems
- Techniques for the installation of street lighting systems
- Techniques for the maintenance of street lighting systems - diagnosing of faults, removing, repairing, replacement and cleaning of public lighting and associated hardware
- Application of specific testing equipment - voltage detectors, insulation resistance testers, clamp-on ammeters, continuity testers, fault indicators
- Techniques for the inspection, testing and commissioning of street lighting systems

T6 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding: working near energised conductors, electrical access, heights, confined space, testing procedures and Licensing rules

T7 Principles to light design layout to an extent indicated by the following aspects:

- Commonwealth, State/Territory and local government legislation, Standards,

REQUIRED SKILLS AND KNOWLEDGE

codes, supply authority regulations and or enterprise requirements applicable to the light design principles

- Requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types of tariffs and charges
- Types of street lighting components - column types, foundations, brackets, luminaries and mounting heights
- Types of electrical street lighting circuits - types of supply, lighting circuit and control circuit
- Fundamentals of lighting production - electromagnetic spectrum, visible and non-visible radiation, spectral energy distribution, infra-red, ultra-violet, radiation-safety, incandescence and phosphorescence and reflection and refraction
- Fundamentals of lighting concepts - terms and units and the purpose of reflectors and diffusers
- Factors affecting external lighting design
- Calculation of light output
- Determining illuminance - point to point and Lumen method
- Determining rated life of luminaries
- Fundamentals of street lighting design
- Considerations for special lighting situations - security lighting, hazardous street locations, and emergency lighting

T8 Principles to layout and draft a street lighting system encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to street lighting system layouts and drafts
- Requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components such as equipment, poles, cross-arms, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length
- Determination of street lighting positions for optimum visibility and minimise traffic hazards
- Techniques in mounting and position of lights
- Resources needed for the installation of street lighting system
- Methods of pegging out of pole positions and/or underground cable positions
- Minimum clearances between overhead conductors and low LV/and HV structures
- Estimation of the duration of overhead distribution extension project

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment

instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables

Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Completion of six (6) technical designs of a Public Lighting systems utilising at least three of the following project types:	Single light on existing assets Main road/minor road schemes Intersections Traffic management devices Alteration to existing assets Multi circuit systems
B	Designs should also include all the following:	Activities that address the correction of errors in the process. Application of a design control checklist which lists all of the required design activities to be carried out in this process.
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a

workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual design of public lighting systems.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design of public lighting systems and may include the following equipment:

Pole (including wood, concrete, steel and composite) associated hardware including conductors (underground, bare wire and aerial bundle cable), LV Switchgear, lanterns, lamps, brackets, signage, supervisory cable, cable TV, Substations, relevant protection systems and associated civil works.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS39A Prepare and manage detailed construction plans for electrical power system infrastructure

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the preparation of detailed plans to be used during the design phase and preparation of as-built drawings during the construction phase, and utilised by network owners as technical reference materials, to detail system infrastructure. It includes the use of CAD or other relevant drafting methods.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice

3)

protection, anti discrimination and training.
 Commonwealth, State/Territory or Local Government
 legislation and regulations may exist that limits the age of
 operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only
 after competency in the following unit(s) has/have been
 confirmed.

Where pre-requisite pathways have been identified. All
 competencies in the Common Unit Group must be have
 been completed plus all the competencies in one (1) of the
 identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus
UETTD RIS62A	Implement and monitor the power

Prerequisite Unit(s)	4)	system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for and coordinate the preparation and management of detailed construction plans for electrical system infrastructure	1.1 OHS practices/procedures, which may influence the preparation and management of detailed construction, plans for electrical system infrastructure are reviewed and determined.
	1.2 Purpose of the construction plans is established and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Established organisational procedures, policies and specifications for the construction plans are obtained or established with the appropriate personnel.
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
	1.5 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
	1.8 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.9 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out and coordinate the preparation and management of detailed construction plans for electrical system infrastructure	2.1 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2 System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.3 Mathematical models of the system are used to analyse the effectiveness of the finished project as per requirements and established procedures.
	2.4 Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.5 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.6 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.7 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
3 Complete and coordinate the preparation and management of detailed construction plans for electrical system infrastructure	3.1 Final inspections of the construction plans are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations

ELEMENT

PERFORMANCE CRITERIA

for approval and, where applicable, statutory or regulatory approval.

- 3.4 Approved copies of construction plan documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of preparing and managing detailed construction plans for electrical system infrastructure

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS39A Prepare and manage detailed construction plans for electrical power system infrastructure

Evidence shall show an understanding of the preparation and management of detailed construction plans for electrical power system to an extent indicated by the following aspects:

T1 Working safely on or around electrical equipment through the application of risk management principles and control measures for dealing with non-electrical hazards and extra-low voltage, low-voltage and high-voltage hazards and high-current hazards encompassing:

- Risk management and assessment of risk encompassing, principle and purpose of risk management and the processes for conducting a risk assessment
- Hazards associated with low-voltage, extra-low voltage and high-currents - arrangement of power distribution and circuits in an electrical installations, parts of an electrical system and equipment that operate at low-voltage and extra-low voltage, parts of an electrical system and equipment where high-currents are likely.
- Risks and control measures associated with high-voltage - parts of an electrical system and equipment that operate at high-voltage, the terms 'touch voltage', 'step voltage', 'induced voltage' and 'creepage' as they relate to the hazards of high-voltage and control measures used for dealing with the hazards of high-voltage
- Optical fibre safety - coherent optical sources and joining procedures and laser safety class 3a devices or their replacement.
- Risks and control measures associated with low voltage encompassing modifying electrical installations, fault finding, maintenance and repair, control measures before, while and after working on electrical installations, circuits or equipment, isolation and tagging-off procedures, risks and restrictions in working live and control measures for working live.
- Risks and control measures associated with harmful dusts and airborne contaminants - thermal insulation, fibrous cement materials and asbestos and other fibre reinforced switchboard materials.
- Safety, selection, use, maintenance and care of test equipment encompassing safety characteristics of electrical testing devices, safe use of electrical testing device and checks and storage methods for maintaining the safety of testing devices.

REQUIRED SKILLS AND KNOWLEDGE

T2 OHS enterprise responsibilities encompassing:

- Provisions of relevant health and safety legislation
- Principles and practice of effective occupational health and safety management
- Management arrangements relating to regulatory compliance
- Enterprise hazards and risks, control measures and relevant expertise required
- Characteristics and composition of workforce and their impact on occupational health and safety management
- Relevance of enterprise management system to occupational health and safety management
- Analysis of working environment and design of appropriate occupational health and safety management systems
- Analysis of relevant data and evaluation of occupational health and safety system effectiveness
- Assess resources to establish and maintain occupational health and safety management systems.

T3 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system, note examples include advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T4 Installation of overhead distribution conductors encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length.
- Constructions types and structures for distribution and sub transmission lines
- Types, sizes and characterises of overhead conductors
- Resources for the stringing and maintenance of conductors - types of low and high voltage overhead electrical conductor connections, causes and effects of poor electrical connections, reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors, minimum clearances between overhead conductors and low and high voltage structures.
- Techniques for conductor installation - types and application of tools, equipment

REQUIRED SKILLS AND KNOWLEDGE

and hardware, methods of stringing, tensioning and termination of low and high voltage conductors.

T5 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - practical demonstration of carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker's body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair
- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - the identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work

T6 Implementation and monitoring requirements for powerline safety encompassing:

- Identification of relevant legislation, codes and government guidelines for the implementation and monitoring of OHS in the workplace - Commonwealth/ State/ Territory legislation relevant to the workplace and the meaning of general duty of care under OHS legislation and common law
- Workplace OHS enterprise plan - responsibilities of each member of the work team, review process for changing/improving OHS safety plan/standing instructions for the systematic management of OHS in the workplace
- Relationship between the OHS committee and employees - methods used to

REQUIRED SKILLS AND KNOWLEDGE

collate and distribute/disseminate OHS information, staff development activities and legislation requirements with regards to OHS training, methods of addressing barriers such as literacy and cultural differences and provisions relating to OHS issue resolution

- Hazards associated with Powerline industry - identification of hazards in the workplace, processes used and contributing factors to a hazardous situation assessment of risks and control of OHS risks (risk management), the hierarchy of control and monitoring of risk control measures
- Risk assessment and its management in Powerline industry - principles and purposes of risk management, processes for conducting risk assessment including risk analysis and risk evaluation activities for selecting and implementing appropriate options for eliminating or minimising risk
- Maintenance strategies for OHS programs - developing processes for promoting, maintaining and improving OHS in the workplace and identify techniques for the evaluating and reviewing OHS education and training programs and elements of an effective OHS management system, OHS consultation and accident/incident investigations

T7 Principles of safe design encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with safe design principles
- Particular reference to state and territory regulations regarding: working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- Application of safe design principles - safe design duty related information, safe design process related information and safe design evaluations

T8 High voltage SWER system encompassing:

- Application and function of SWER system components
- Circuit arrangement
- Principle of operation
- Hazards and procedures associated with faulty SWER earth systems
- Procedure to isolate, energise and commission SWER substations

T9 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T10 Power distribution network documentation encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, instruction/worksheets sheets.
- Interpretation of different diagrams and documentation on LV and HV systems - overhead distribution extensions, underground distribution extensions, distribution substation, street lighting systems.

T11 System components and layouts encompassing:

- Distribution system layouts - overhead/underground, urban/rural, HV customers, high rise building systems, three phase lines, single phase lines, SWER systems, spur, parallel and ring systems, typical substation types.
- Transmission system layouts - lines, buses, transformers and cables, line/bus layouts including single, double, ring and breaker and half systems, HV crossing methods.

T12 Circuit breaker auxiliary systems encompassing:

- Types and characteristics of high pressure air systems including air storage and air handling processes
- Types and characteristics of DC systems including battery types, charging systems, protection systems
- Types and characteristics of special ambient gases (SF6) systems including gas conditioning, storage and handling systems
- Types and characteristics of vacuum interrupters
- Types and characteristics of oil filled and oil handling

T13 DC transmission systems encompassing:

- Structure of DC transmission systems
- Types of equipment required for DC transmission systems
- Types of connections used for DC transmission systems
- Principles of control of DC transmission systems
- Advantages of DC transmission in comparison to AC transmission
- Disadvantages of DC transmission in comparison to AC transmission

T14 AC transmission line electrical parameters encompassing:

- Typical arrangements
- Parameters of significance
- Calculation of line parameters - Calculation of resistive, inductive and capacitive values assuming regular transposition and solid conductors
- Comparison with actual values
- Typical parameter values and ratios for different voltage level lines.

REQUIRED SKILLS AND KNOWLEDGE

T15 AC transmission line models encompassing:

- Types of transmission line models based on line length
- Calculation of voltage drop, line regulation, and transmission efficiency
- Load sharing between lines.

T16 Voltage control techniques encompassing:

- Conditions leading to voltage collapse
- Effects on system of high and low voltage
- Voltage control devices - voltage regulators applied to generators and synchronous phase modifiers, electromagnetic voltage regulators, series and parallel capacitors, OLTC transformers and static VAR compensators (SVC's). SVC's includes saturated reactor compensators; thyristor controlled reactor compensators and combined systems
- Production of harmonics and methods of harmonic control
- Location of voltage control devices within the system

T17 Voltage control devices encompassing:

- Typical devices applications and capacities
- Estimation of rating of VAR regulating devices using graphical techniques

T18 System components and layouts encompassing:

- Distribution system layouts - overhead/underground, urban/rural, HV customers, high rise building systems, three phase lines, single phase lines, SWER systems, spur, parallel and ring systems, typical substation types.
- Transmission system layouts - lines, buses, transformers and cables, line/bus layouts including single, double, ring and breaker and half systems, HV crossing methods.

T19 Corona encompassing:

- Factors leading to the generation of corona - voltage levels, conductor spacings, conductor sizes and shaping, atmospheric conditions
- Consequences of corona
- Corona reduction - conductor selection, conductor bundling, conductor surface treatment, grading rings
- Internal discharge - causes of internal discharge, effects of internal discharge, testing techniques

T20 Protection system types encompassing:

- Requirements of a protection scheme - relationship to primary system design, purpose of protection, safety of persons, protection of plant, system instability, system break up, loss of customers, loss of revenue, protection zones, restricted schemes, unrestricted schemes, duplicate protection, local backup protection, remote backup protection, selectivity, discrimination, stability, sensitivity, reliability

REQUIRED SKILLS AND KNOWLEDGE

- Components of a protection scheme - current transformers, potential transformers, summation current transformers, interposing transformers, multi tapped transformers, all-or-nothing relays, induction relays, balanced beam relays, directional relays, biased relays, solid state relays, microprocessor based relays, gas relays, thermal sensors, hardwired communication, powerline carriers systems, microwave systems, fibre optic systems, need for isolation, need for interfacing
- Protection applied to buses - overload, differential, earth leakage, structure leakage, combined schemes, protection overlap
- Protection applied to transformers - biased differential, gas, winding temperature, oil temperature
- Protection applied to single/radial lines - overcurrent, earth leakage, slow earth leakage, distance, auto reclose, sectionalising, over voltage
- Protection applied to interconnected lines - overcurrent, pilot wire, directional, directional overcurrent, current differential, phase comparison, current comparison, distance, impedance, admittance, offset.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord

with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as

- specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Preparation of six (6) compliant detailed plans that relate to the following project types:	Overhead line designs Underground line designs Distribution substations designs Transmission and subtransmission substations designs Public lighting designs Zone substation designs Customer Substation designs
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated

		in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual preparation and management of detailed construction plans for electrical system infrastructure

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the preparation and management of detailed construction plans for electrical infrastructure and may include the following equipment:

Drafting software, Computer hardware, Reference manuals, Design sketches

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS40A Prepare and appraise power systems financial impact statements

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the creation, interpretation and application of financial impact statements in electricity network infrastructure augmentations, maintenance and construction activities. It includes project scoping, cost estimating, providing economic justifications and cost benefit analysis and the use of guarantee and capital contribution arrangements with customers.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus

Prerequisite Unit(s) **4)**

UETTDARIS62A Implement and monitor the power system organisational OHS policies, procedures and programs

UETTDARIS63A Implement and monitor the power system environmental and sustainable energy management policies and procedures

Testing Pathway Unit Group

UEENEED104A Use engineering applications software on personal computers

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits problems

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDARTS21A Maintain interdependent network protection and control systems

UETTDARTS22A Commission interdependent network protection and control systems

UETTDARTS29A Develop power systems secondary isolation instructional documents

UETTDARTS35A Maintain complex network protection and control systems

Design Pathway Unit Group

UETTDARDS39A Prepare and manage detailed construction plans for electrical

Prerequisite Unit(s) 4)

power system infrastructure

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
<p>1 Plan for and coordinate the preparation and appraisal of financial impact statements</p>	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures which may influence the preparation and appraisal of financial impact statements are reviewed and determined.</p>
	<p>1.2 Purpose of the financial statement is established and expected outcomes of the work are confirmed with the appropriate personnel.</p>
	<p>1.3 Established procedures, policies and specifications for financial impact statement preparation and appraisal are obtained or established with the appropriate personnel.</p>
	<p>1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.</p>
	<p>1.5 Risk control measures are identified, prioritised and evaluated against the work schedule.</p>
	<p>1.6 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.</p>
	<p>1.7 Personnel participating in the work are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.</p>
<p>2 Carry out and coordinate the preparation and appraisal of financial impact statements</p>	<p>2.1 Circuit system modelling is used to evaluate alternative proposals as per established procedures.</p>
	<p>2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.</p>
	<p>2.3 Quality of work is monitored against personal</p>

ELEMENT

PERFORMANCE CRITERIA

- performance agreement and/or established organisational and professional standards.
- 2.4 Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.5 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 3 Complete and coordinate the preparation and appraisal of financial impact statements
- 3.1 Final inspections of the financial impact statement are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the appraisal brief.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of financial impact statement documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of preparing and appraising financial impact statements.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS40A Prepare and appraise power systems financial impact statements

Evidence shall show an understanding of the preparation and appraisal of power systems financial impact statements to an extent indicated by the following aspects:

T1 Principles of safe design to an extent indicated by the following aspects:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with safe design principles
- Particular reference to state and territory regulations regarding: working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- Application of safe design principles - safe design duty related information, safe design process related information and safe design evaluations

T2 Methodology used in writing enterprise specific management reports to an extent indicated by the following aspects:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the writing enterprise specific management reports
- Techniques in researching, collating and analysing information for the report - recording, filing, retrieving systems and storing and retrieving data from computer systems
- Relationship of management reports to enterprise policies and procedures - enterprise structure and resources, Workplace OHS and risk management enterprise data, financial and operational data
- Environmental enterprise policies and procedures
- Industrial relations policies and procedures
- Anti-discrimination policies and procedures:
- Techniques in writing enterprise specific management reports - methods used to disseminate information and facilitate enterprise requirements, document proformas and compliance and legislative requirements to produce effective reports in the appropriate format

T3 Evidence shall show an understanding of financial impact statements encompassing:

- Techniques in budgeting and tracking project progress
- Preparation and analysis of budget figures

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in the co-ordination of contingencies and risks that have a budget effect
- Techniques in dealing with problems that have a budget effect
- Examples of forms of recording project status and costings
- Application of relevant computer software packages
- Methods of prepare proposals encompassing: prepare specifications, tender and evaluation and letting of tenders
- Techniques in estimating - contract documents, drawings, specifications, general conditions, special conditions
- Resources costs - hourly rates (labour, plant, material, subcontractors), direct and indirect costs, contingency costs, project margin, cost of money, budget, preliminary tender, labour costing, equipment costing, economic comparisons and contract variations
- Techniques in prepare and interpret proposals and tender documents
- Techniques in preparing tender documents
- Techniques in interpret tender documents
- Techniques in preparing cost estimates for a project from relevant data
- Techniques in preparing financial impact statements

T4 Project management encompassing:

- Commonwealth, State and local government legislation, standards, codes, supply authority regulations and or enterprise requirements including relevant certification and licensing applicable to the duties and responsibilities for management a project
- Analyse functions of project management to determine achievement of project objectives
- Relationship of stakeholders to the project
- Techniques in development of project plan - project integration, scope, timelines, cost, quality, resources, communication/protocol requirements, risk/uncertainties and procurement and contacting
- Relationship between project processes, project life and project phases
- Planning and control procedures, resource management and risk management
- Techniques, methodologies and tools available to project managers
- Types of internal and external environmental factors that may affect the project

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Completion of six (6) designs in total drawn from at least two (2) of the following project types:	Overhead line designs Underground line designs Distribution substations designs Customer substations designs Transmission substations designs Sub-transmission substations designs Public lighting designs Zone substation designs Substation secondary systems – Commissioning. Substation secondary systems –Maintenance and augmentation. Generation secondary systems –Commissioning. Generation secondary systems –Maintenance and augmentation. HV Primary plant –Commissioning. HV Primary plant –Maintenance and augmentation
B	Financial Impact Statements shall also include:	Activities that address the correction of errors in the process.
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to

		provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual preparation and appraisal of financial impact statements

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the preparation and appraisal of financial impact statements and may include the following equipment:

Financial software, Computer hardware, Design sketches.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS41A Manage electrical power systems infrastructure projects

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the work planning and resource requirements, and financial control of infrastructure projects being undertaken within the distribution, sub transmission and transmission, overhead and underground networks. It includes project management activities, which may involve the simultaneous management of many projects, and must encompass at least 20 identifiable tasks.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice**3)**

safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus

Prerequisite Unit(s)	4)	
	UETTDARDS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDARDS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	Testing Pathway Unit Group	
	UEENEED104A	Use engineering applications software on personal computers
	UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
	UEENEEE124A	Compile and produce an energy sector detailed report
	UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDRTS21A	Maintain interdependent network protection and control systems
	UETTDRTS22A	Commission interdependent network protection and control systems
	UETTDRTS29A	Develop power systems secondary isolation instructional documents
	UETTDRTS35A	Maintain complex network protection and control systems
	Design Pathway Unit Group	
	UETTDARDS39A	Prepare and manage detailed construction plans for electrical

Prerequisite Unit(s) 4)

power system infrastructure

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for and coordinate the management of electrical infrastructure projects	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the management of electrical infrastructure projects, are reviewed and determined.
	1.2 Purpose of the electrical infrastructure project is established and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Organisational established procedures on policies and specifications for the electrical infrastructure project are obtained or established with the appropriate personnel.
	1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures.
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Site is prepared according to the work schedule

ELEMENT**PERFORMANCE CRITERIA**

- and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
- 1.12 Positioning of road signs, barriers and warning devices is planned in accordance with requirements.
- 2 Carry out and coordinate the management of electrical infrastructure projects
- 2.1 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
- 2.2 System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
- 2.3 Mathematical models of relevant networks are used to analyse the effectiveness of the finish project as per requirements and established procedures.
- 2.4 Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.5 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.6 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
- 2.7 Quality of work is monitored against personal

ELEMENT	PERFORMANCE CRITERIA
	performance agreement and/or established organisational and professional standards.
	2.8 Electrical infrastructure decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.9 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
3 Complete and coordinate the management of electrical infrastructure projects	3.1 Final inspections of the infrastructure are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
	3.4 Approved copies of project documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of managing electrical infrastructure projects.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS41A Electrical power systems infrastructure projects

Evidence shall show an understanding of the management of electrical power systems infrastructure projects to an extent indicated by the following aspects:

T1 Installation of overhead distribution conductors encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length.
- Constructions types and structures for distribution and sub transmission lines
- Types, sizes and characterises of overhead conductors
- Resources for the stringing and maintenance of conductors - types of low and high voltage overhead electrical conductor connections, causes and effects of poor electrical connections, reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors, minimum clearances between overhead conductors and low and high voltage structures.
- Techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of low and high voltage conductors.

T2 Safe working practices and procedures for the installation of overhead distribution conductors encompassing:

- Limits of approach for personnel, vehicles, mobile plant and elevating work platforms (EWP)
- Requirements of persons prior to making bare hand contact with dead low voltage mains and apparatus
- Requirements of relevant electrical access permits necessary to allow work to be performed on low and high voltage apparatus
- Safe working practices - requirements to enable safe working on conductive poles and procedure to attach an “on-site” earthing device to de-energised low and high voltage overhead circuit

T3 Installation of poles and or structures and hardware encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing poles and associated hardware
- Requirements for the use of enterprise construction manuals, system

REQUIRED SKILLS AND KNOWLEDGE

diagrams/plans and drawings - characteristics and applications of different types of poles and associated hardware

- Techniques for installing poles and associated hardware - types of installation equipment/tools, excavation methods, types of footings/foundations, types of attachments, earthing systems, clearances between conductors, safe methods of erecting and stabling poles and or structures and cross arms.
- Techniques for maintenance of poles and associated hardware - stabilisation techniques for unstable poles, methods of strengthen poles, maintenance and replacement of high voltage insulators and cross arms.

T4 Installation of low voltage electrical services encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - types of low voltage overhead services, methods of construction and installation, minimum clearances for overhead services to assets and structures and types of installation equipment/tools
- Characteristics and applications of different types of cables - cable cross-sectional area of conductors and current rating and fuse type
- Techniques for maintenance of service installations - diagnosis and repair of faults
- Jointing and terminating methods - polymeric heat shrink materials, polymeric tape materials, energised and de-energised cables and connections to fuse boxes and pole top boxes
- Testing and commissioning procedures - inspection and polarity, voltage and phase sequence tests
- Construction types and structures for distribution and sub transmission lines
- Types, sizes and characteristics of overhead conductors
- Resources for the stringing and maintenance of conductors - types of low and high voltage overhead electrical conductor connections, causes and effects of poor electrical connections, reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors and minimum clearances between overhead conductors and low and high voltage structures
- Techniques for conductor installation - types and application of tools, equipment and hardware and methods of stringing, tensioning and termination of low and high voltage conductors

T5 Procedures for installation and maintenance on transmission lines, structures and hardware encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and maintenance of transmission lines and associated equipment
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, encompassing: minimum construction clearances for transmission lines and sag/tension requirements

REQUIRED SKILLS AND KNOWLEDGE

- Construction types and structures used in transmission lines
- Types, sizes and characteristics of transmission conductors - aluminium conductors steel reinforced and earthing conductors
- Types of electrical connections used to connect transmission conductors - compression termination and bolted termination
- Causes and effects of poor electrical connections
- Types and application of specialised tools, equipment and hardware for the stringing of transmission conductors
- Techniques for stringing, tensioning and terminating transmission conductors
- Techniques for installation of associated hardware used on transmission towers
- Techniques for maintenance of damaged transmission conductors - repair and replacement

T6 Procedures for installation and maintenance on public lighting structures and associated equipment encompassing:

- Standards, codes, legislation, supply authority regulations, local government and or enterprise requirements pertaining to the installation and maintenance of public lighting systems and associated equipment
- Safety precautions specific to working on street lighting - safe working practices and procedures, safe clearances from LV and HV mains, working at heights, working in confined spaces, permit to work systems and isolation procedures, emergency response and rescue including First Aid etc.
- Basic public lighting principles - electromagnetic spectrum, principles of colour, behaviour of light, factors that affect illumination.
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - street lighting circuits, earthing system
- Types of tools and equipment used for installation and maintenance
- Types and function of lanterns/Luminaires/lamps, control equipment, poles and associated hardware used for street lighting - HP mercury vapour, LP and HP sodium vapour, fluorescent, quartz-halogen, wood, concrete, steel, composite, choke boxes, photo-electric cells, time switches, contactor boxes
- Types of lighting systems - overhead and underground street lighting systems, controlling and switching of lighting systems.
- Techniques for the installation of street lighting systems
- Techniques for the maintenance of street lighting systems - diagnosing of faults, removing, repairing, replacement and cleaning of public lighting and associated hardware.
- Application of specific testing equipment - voltage detectors, insulation resistance testers, clamp-on ammeters, continuity testers, fault indicators
- Techniques for the inspection, testing and commissioning of street lighting systems

T7 Different types and function of distribution components encompassing:

- Commonwealth/State/Territory and local government legislation, Standards,

REQUIRED SKILLS AND KNOWLEDGE

codes, supply authority regulations and or enterprise requirements applicable to the use and application of distribution components

- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
- Types, function and characteristics of distribution components
- Safety policies and procedures precautions related to the handling and installing distribution components

T8 Principles of safe design encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with safe design principles
- Particular reference to state and territory regulations regarding: working near energised conductors, electrical access, heights, confined space, testing procedures and Licensing rules
- Application of safe design principles - safe design duty related information, safe design process related information and safe design evaluations

T9 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings encompassing: types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment and LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures and earthing procedures
- Personnel protective equipment (PPE) for LV switching

T10 High voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment and network interconnectors source of possible backfeed
- Role of the HV switching operator
- Operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms and access authorities and permits
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc strangles
- Types and categories of HV switchgear
- Application, function and operating capabilities of switchgear

REQUIRED SKILLS AND KNOWLEDGE

- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV transmission main and working earths
- Earthing HV electrical apparatus practices and procedures for access - purposes of “Operational” and additional work part “on-site” earths, factors determining the location and effectiveness of “Operational” earthing, acceptable industry procedures and personal protective equipment
- High voltage switching techniques
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

T11 High voltage fault switching principles encompassing:

- Primary causes, effects and types of HV electrical faults
- HV protection devices - main components, types, categories, applications and functions
- Basic principle of operation of HV system protection devices
- Protection co-ordination and protection “zoning”
- HV feeder auto-reclosing suppression - function and application
- Circuit condition requirements and switching considerations when paralleling and separating HV feeders

T12 Implementation and monitoring requirements for the impact of powerline installations and operation on the environment and/or the area surrounding the powerline and/or equipment encompassing:

- Identification of relevant legislation, codes and government guidelines for the implementation and monitoring of environmental impact factors in the workplace and areas of power distribution or transmission - Commonwealth/State/Territory legislation relevant to the workplace and the Environment Protection Act legislation and common law
- Identification, assessment, control and monitoring of the hazards to the environment associated with the Powerline industry
- Workplace environment quality standards enterprise plan - setting of acceptable emission level limits from power plant equipment, impact of the enterprise activities on air and water quality, nature, impact and level of emissions from power plant, power distribution and transmission equipment and network infrastructure (noise generation, noxious gas emissions, greenhouse gas production, electromagnetic emissions, electromagnetic field strength, oil leakage, insulation breakdown products)
- Provision of manufacturers and suppliers information such as material safety data sheets (MSDSs)
- Gathering of environment management information
- Maintenance of environmental records
- Risk assessment and its management in Powerline industry
- Maintenance strategies for environment protection programs - developing

REQUIRED SKILLS AND KNOWLEDGE

processes for promoting, maintaining and improving environmental impact in the workplace and identify techniques for the evaluating and reviewing environment protection education and training programs and elements of an effective environment protection management system, EPA consultation and accident/incident investigations.

T13 Power distribution network documentation encompassing:

- Requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, instruction/worksheets sheets.
- Interpretation of different diagrams and documentation on LV and HV systems - overhead distribution extensions, underground distribution extensions, distribution substation, street lighting system.

T14 Layout principles for overhead distribution encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to overhead distribution layout
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components such as equipment, poles, cross-arms, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards, minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length –
- Resources needed for the stringing and maintenance of conductors
- Types of low LV and HV overhead electrical conductor connections
- Minimum clearances between overhead conductors and low LV and/HV structures
- Estimation of the duration of overhead distribution extension project

T15 Fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply and aviation authority regulations and or enterprise requirements applicable to the surveying for an overhead and underground extension
- Techniques in measuring heights and distances
- Techniques in taking bearings angles of deviation using a compass
- Techniques in using a clinometer
- Techniques in recording and storage of data

REQUIRED SKILLS AND KNOWLEDGE

- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
- Techniques in plotting long spans - measuring stick, clinometer, trundle wheel, tapes, correction for sloping ground, distance across objects and range rods
- Techniques in pegging pole positions – foot path alignments, types of pegs, pegs of other authorities and locating survey pegs

T16 Project management encompassing:

- Commonwealth, State and local government legislation, standards, codes, supply authority regulations and or enterprise requirements including relevant certification and licensing applicable to the duties and responsibilities for management a project
- Analyse functions of project management to determine achievement of project objectives
- Relationship of stakeholders to the project
- Techniques in development of project plan encompassing: project integration, scope, timelines, cost, quality, resources, communication/protocol requirements, risk/uncertainties and procurement and contacting
- Relationship between project processes, project life and project phases
- Planning and control procedures, resource management and risk management
- Techniques, methodologies and tools available to project managers
- Types of internal and external environmental factors that may affect the project

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this

shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Manage at least six (6) projects that, each encompass at least twenty (20) identifiable tasks and that relate to four (4) the following project types:	Distribution overhead projects Distribution underground projects Distribution substations projects Public lighting projects Zone substation projects Transmission substation primary systems projects Transmission overhead projects

		Transmission underground projects Substations secondary system projects Generation secondary system projects
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual management of electrical infrastructure projects

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit

applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the management of electrical infrastructure projects and may include the following: contract and in-house workforces, project management software.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems

RANGE STATEMENT

- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETDRDS42A Investigate quality of power systems supply issues

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the technical investigation of quality of supply issues and recommending solutions. Quality of supply issues may include television and radio interference, voltage complaints, harmonics and system irregularities.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government

License to practice**3)**

legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic engineering computational problems
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits

Prerequisite Unit(s)	4)	
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDNIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDNIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDARDS35A	Design overhead distribution power systems
	UETTDARDS36A	Design underground distribution power systems
	Pathway Unit Group 1	
	UETTDARDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure
	UETTDARDS45A	Organise and implement ESI line and easement surveys
	Pathway Unit Group 2	
	UETTDARDS43A	Develop high voltage and low voltage distribution protection systems

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in

Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1 Plan for and coordinate the investigation of issues in the quality of supply	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the investigation of issues in the quality of supply, are reviewed and determined.
	1.2 Purpose of the investigation is established and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Organisational established procedures on policies and specifications for the investigation are obtained or established with the appropriate personnel.

ELEMENT**PERFORMANCE CRITERIA**

- 1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures.
- 1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
- 1.6 Risk control measures are identified, prioritised and evaluated against the work schedule.
- 1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
- 1.12 Positioning of road signs, barriers and warning devices is planned in accordance with requirements.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out and coordinate the investigation of issues in the quality of supply	<p>2.1 Circuit/system modelling is used to evaluate alternative proposals as per established procedures.</p> <p>2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.</p> <p>2.3 Investigation decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.</p> <p>2.4 Mathematical models of the quality system are used to analyse the effectiveness of the finished product/service as per requirements and established procedures.</p> <p>2.5 Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.</p> <p>2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.</p> <p>2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.</p> <p>2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.</p> <p>2.9 Testing of supply quality is undertaken according to requirements and established procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
3 Complete and coordinate the investigation of issues in the quality of supply	<p>3.1 Final assessments of the quality of project are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the supply brief.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of quality assessment documents are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of investigating quality of supply issues.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS42A Quality of power systems supply issues

Evidence shall show an understanding of investigating the issues of the quality of power systems supply the designing of underground distribution power systems to an extent indicated by the following aspects:

T1 Detailed operation of fundamental test equipment encompassing:

- Care and safe use
- Operating principles
- Comparison of different operating principle meters used for the same purpose
- Accuracy and loading effects of meters: note; examples include measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence and the use of oscilloscopes

T2 Detailed operation of field device test equipment encompassing:

- Care and safe use
- Operating principles
- Comparison of different operating principle meters used for the same purpose
- Accuracy and loading effects of meters: note; examples include measurement of voltage, current, power, reactive power, phase angle, resistance, inductance, capacitance, impedance, frequency, harmonics and the use of transient and data logging devices

T3 Quality of supply measures encompassing:

- Measure, analysis and provide solutions for the following; voltage variation outside of standards, voltage sags and swells, repeated fluctuations, impulses, momentary, interruptions, frequency variation and harmonics - causes, effects and methods of minimisation

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Completing six (6) technical solutions to issues relating to the following project types:	Television and radio interference Voltage irregularities in an urban area Voltage irregularities in a rural area Voltage irregularities affecting an industrial/commercial customer Voltage irregularities in an underground area
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual evaluation of quality of supply issues.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

**Method of
assessment** 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the investigation of supply issues and may include the following: distribution feeders/networks, substations, transformers, HV switchgear, LV switchgear, relevant protection systems, fuses and circuit breakers.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS43A Develop high voltage and low voltage distribution protection systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the development of appropriate protection systems for HV and LV distribution networks, including calculations of fault levels, selection of appropriate protection devices and automation requirements and protection coordination schemes. This also includes recommendations to support the calculations and must ensure conformance to specific organisational operational and system planning requirements, and compliance with national or supply authority codes.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice

3)

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic engineering computational problems

Prerequisite Unit(s)	4)	
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged

Employability Skills

5)

will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Plan and coordinate for the development of HV and LV protection systems

- 1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the development of HV and LV protection systems, are reviewed and determined.
- 1.2 Purpose of the development is established and expected outcomes of the work are confirmed with the appropriate personnel.
- 1.3 Organisational established procedures on policies and specifications for the development are obtained or established with the appropriate personnel.
- 1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures.
- 1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
- 1.6 Risk control measures are identified, prioritised and evaluated against the work schedule.

ELEMENT

PERFORMANCE CRITERIA

- | | |
|------|---|
| 1.7 | Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures. |
| 1.8 | Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order. |
| 1.9 | Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work. |
| 1.10 | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures. |
| 1.11 | Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures. |
| 2 | Carry out and coordinate the development of HV and LV protection systems |
| 2.1 | Circuit/systems modelling is used to evaluate alternative proposals as per established procedures. |
| 2.2 | OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures. |
| 2.3 | System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures. |
| 2.4 | Mathematical models of the HV/LV protection system are used to analyse the effectiveness of the finished project as per requirements and established procedures. |
| 2.5 | Technical advice is given to potential hazards, safety risks and control measures so that |

ELEMENT

PERFORMANCE CRITERIA

- monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
- 2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 3 Complete and coordinate the development of HV and LV protection systems
- 3.1 Final inspections of the system design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of design documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing HV and LV distribution protection systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS43A HV and LV distribution protection systems

Evidence shall show an understanding of the for the development of HV and LV distribution protection systems to an extent indicated by the following aspects:

T1 OHS enterprise responsibilities encompassing:

- Provisions of relevant health and safety legislation
- Principles and practice of effective occupational health and safety management
- Management arrangements relating to regulatory compliance
- Enterprise hazards and risks, control measures and relevant expertise required
- Characteristics and composition of workforce and their impact on occupational health and safety management
- Relevance of enterprise management systems to occupational health and safety management
- Analysis of working environment and design of appropriate occupational health and safety management systems
- Analysis of relevant data and evaluation of occupational health and safety system effectiveness
- Assess resources to establish and maintain occupational health and safety management systems.

T2 Principles of safe design encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with safe design principles
- Particular reference to state and territory regulations regarding: working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- Application of safe design principles - safe design duty related information, safe design process related information and safe design evaluations

T3 Installation of switchgear and associated equipment encompassing:

- Types and function of various switchgear: note; examples include isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques

REQUIRED SKILLS AND KNOWLEDGE

- Types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- Installation procedures for switchgear and equipment encompassing: standards, codes, legislation, supply authority regulations and or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques and pole mounted locations
- Maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry standards and procedures
- Testing and commissioning - electricity supply industry standards and procedures

T4 Electrical equipment associated with distribution field device protection and control schemes encompassing:

- Types and applications of electrical equipment: characteristics and capabilities - schemes, automatic circuit reclosers (ACR's), gas switches, secondary injection tests, primary injection tests, TMR Radio's, SCADA, remote control, overcurrent, earth fault, sensitive earth fault, inverse time curves, definite time curves, tripping, reclose, DC supplies, AC supplies and alarms

T5 Calculation of fault levels encompassing:

- Calculation of fault levels in symmetrical and asymmetrical fault conditions - types of faults, interconnected and radial systems, symmetrical components, representation of voltages and currents, sequence impedances of system plant, calculation/determination of sequence impedance networks, determination of operative sequence impedances, fault or arc impedances, first approximation techniques
- Interrupting device capabilities - determination of fault current breaking capability and let through energy capability of fuses and circuit breakers, DC offset and transient condition effects

T6 Detailed operation and setting of discrete protection systems encompassing:

- Earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination, backup protection
- Overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination, backup protection
- Alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, over temperature schemes

T7 Polyphase systems and its application towards the calculation of circuits' conditions encompassing:

- Structure of a three phase system - components, sequence of phases and balanced and unbalanced load conditions

REQUIRED SKILLS AND KNOWLEDGE

- Calculations of phase and line voltages for a specified phase sequence
- Calculation of voltage, current, power, power factor in a three phase system - balanced three phase systems, unbalanced delta connected loads, unbalanced four-wire star connected loads, unbalanced three-wire star connected loads and unbalanced four-wire star connected systems
- Calculation of the neutral displacement voltage in unbalanced three-wire star connected systems
- Selection and connection of meters to confirm calculations
- Control of harmonics - harmonic analysis of non-sinusoidal waves of voltage and current, production of harmonics in three phase power systems, effects of harmonics on three power systems and loads, types of harmonics commonly encountered on three phase power systems and identification by observation of harmonic components present in a waveform
- Calculation of effective value of non-sinusoidal waves
- Calculate the current/voltage in a complex load given a voltage/current with a Fourier analysis of up to 3 terms
- Pre-unit system in calculations - reasons for use, groups of parameters commonly represented, common applications of the per-unit system to represent device specifications and applications of per-unit quantities in simple electrical calculations
- Method of symmetrical components - reasons for the use, types of components used to represent a three phase system, reasons for difference in the impedance of a component to the various symmetrical components and commonly occurring relationships between different sequence impedances for common component groups

T8 Protection schemes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to protection schemes
- Types of protection schemes - reasons for use, application of protection zones around system elements and degree of protection
- Types of feeder protection equipment - over current protection inverse time-current operating characteristics
- Operation of over current protection equipment used on distribution systems
- Operation of ACRs and their time-current characteristics
- Types and characteristics of over-current relays
- Coordination methods of a distribution feeder protection scheme
- Earth fault protection used on a distribution feeder
- Operation of a single wire earth return (S.W.E.R) system

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables

Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Completion of at least two (2) designs from each of two (2) of the following project types:	Distribution overhead designs Distribution underground designs Distribution substations designs
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual development of high voltage and low voltage distribution protection systems

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the development of high voltage and low voltage distribution protection systems and may include the following equipment:

ACR, regulator, earthing, air break switches, gas switches, capacitor units, transformers, links, fuses, sectionalisers, lighting arrestors, HV Switchgear, LV Switchgear, control boxes, communications equipment, , supervisory cable, cable TV, Substations, relevant protection systems and associated civil works.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS44A Design power system substations modifications

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the design of modifications within a substation. This may include busbar upgrades, equipment replacement projects and basic secondary upgrades or SCADA modifications. The design may include civil engineering aspects and must conform to safety regulations and environmental standards and incorporate the principles of safe design.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

- License to practice** 3)
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

- Prerequisite Unit(s)** 4)

- Competencies** 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus
UETTDRLS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTDRLS63A	Implement and monitor the power system environmental and sustainable energy management

Prerequisite Unit(s) 4)

policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for and coordinate the design of substations	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of substations, are reviewed and determined.</p> <p>1.2 Purpose of the design is established and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Established organisational procedures, policies and specifications for the design are obtained or established with the appropriate personnel.</p> <p>1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures.</p> <p>1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.</p> <p>1.6 Risk control measures are identified, prioritised and evaluated against the work schedule.</p> <p>1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.</p> <p>1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.</p> <p>1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.</p> <p>1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with</p>

ELEMENT	PERFORMANCE CRITERIA
2 Carry out and coordinate the design of substations	<p>established procedures.</p> <p>1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.</p> <p>2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.</p> <p>2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.</p> <p>2.3 System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.</p> <p>2.4 Mathematical models of the system are used to analyse the effectiveness of the finished project as per requirements and established procedures.</p> <p>2.5 Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.</p> <p>2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.</p> <p>2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.</p> <p>2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.</p>

ELEMENT	PERFORMANCE CRITERIA
3 Complete and coordinate the design of substations	<p>3.1 Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of design documents are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing substation modifications.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS44A Power system zone substations modifications - Design

Evidence shall show an understanding of the design of power system zone substations modifications to an extent indicated by the following aspects:

T1 Electrical computations encompassing:

- Graph functions and applications - linear, non linear, parabolic, hyperbolic, logarithmic and exponential
- Complex numbers - polar form and rectangular form
- Simultaneous equations
- Quadratic equations
- Phasor diagrams
- Star-delta transformations.

T2 Working safely on or around electrical equipment through the application of risk management principles and control measures for dealing with non-electrical hazards and extra-low voltage, low-voltage and high-voltage hazards and high-current hazards encompassing:

- Risk management and assessment of risk - principle and purpose of risk management and processes for conducting a risk assessment
- Hazards associated with low-voltage, extra-low voltage and high-currents - arrangement of power distribution and circuits in an electrical installations, parts of an electrical system and equipment that operate at low-voltage and extra-low voltage and parts of an electrical system and equipment where high-currents are likely.
- Risks and control measures associated with high-voltage - parts of an electrical system and equipment that operate at high-voltage, the terms 'touch voltage', 'step voltage', 'induced voltage' and 'creepage' as they relate to the hazards of high-voltage and control measures used for dealing with the hazards of high-voltage
- Optical fibre safety - coherent optical sources and joining procedures and laser safety class 3a devices or their replacement
- Risks and control measures associated with low voltage - risks associated with modifying electrical installations, fault finding, maintenance and repair, control measures before, while and after working on electrical installations, circuits or equipment, isolation and tagging-off procedures, risks and restrictions in working

REQUIRED SKILLS AND KNOWLEDGE

live and control measures for working live

- Risks and control measures associated with harmful dusts and airborne contaminants - thermal insulation, fibrous cement materials and asbestos and other fibre reinforced switchboard materials.
- Safety, selection, use, maintenance and care of test equipment - safety characteristics of electrical testing devices, safe use of electrical testing device and checks and storage methods for maintaining the safety of testing devices

T3 OHS enterprise responsibilities encompassing:

- Provisions of relevant health and safety legislation
- Principles and practice of effective occupational health and safety management
- Management arrangements relating to regulatory compliance
- Enterprise hazards and risks, control measures and relevant expertise required
- Characteristics and composition of workforce and their impact on occupational health and safety management
- Relevance of enterprise management systems to occupational health and safety management
- Analysis of working environment and design of appropriate occupational health and safety management systems
- Analysis of relevant data and evaluation of occupational health and safety system effectiveness
- Assess resources to establish and maintain occupational health and safety management systems.

T4 Generation systems encompassing:

- Methods of generating electricity - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
- Relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
- The purpose and features of typical types of co-generation systems

T5 Substations and power transformers encompassing:

- Relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
- Characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling
- Auxiliary equipment used on transformers - function and basic operation
- Maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault finding procedures
- Characteristics of a reactors - description and purpose

REQUIRED SKILLS AND KNOWLEDGE

T6 Safe working on energised low voltage equipment encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on or near energised low voltage conductors - safe working practices and procedures, identification of hazards, assessment and control of OHS risks and types, selection, maintenance and use of personal protective equipment
- Work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools and safe procedures for work on panels and in cubicles on or near energised LV conductors
- Release and rescue procedures for work on or near exposed energised LV conductors

T7 Installation of metering and control equipment encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
- Types of meters - kilowatt-hour meters single and polyphase, demand meters, recording meters and electronic recording metering systems summators
- Installation and removal methods - direct connection and plug in method, and enterprise specific
- Types of associated equipment and accessories - meter boards, service fuse, links, contactors, time switch, audio frequency injection relay
- Testing procedures - safety testing and polarity testing

T8 Principles of Statutory and safety considerations encompassing

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T9 Electrical equipment associated with protection and control schemes encompassing:

- Types and applications of electrical equipment: characteristics and capabilities - schemes, overcurrent, frame leakage, cooling, buchholz, DC supplies, restricted earth, sensitive earth fault, CB fail, reclose, DC frame leakage, CEL Fail, under frequency load shed and earth fault

T10 Principles of safe design encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with safe design principles
- Particular reference to state and territory regulations regarding: working near

REQUIRED SKILLS AND KNOWLEDGE

energised conductors, electrical access, heights, confined space, testing procedures and Licensing rules

- Application of safe design principles - safe design duty related information, safe design process related information and safe design evaluations

T11 Installation of switchgear and associated equipment encompassing:

- Types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing requirements and techniques
- Types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- Installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques and pole mounted locations
- Maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry standards and procedures
- Testing and commissioning - electricity supply industry standards and procedures

T12 Environmental fundamentals encompassing:

- Environmental standards, codes, environmental legislation, supply authority regulations and or enterprise requirements applicable to the control of environment associated with the worksite encompassing: relevant federal legislation, relevant state/territory legislation, relevant local government by-laws, relevant government or quasi government policies and regulations and relevant community planning and development agreements - land care agreements
- Employer and employee responsibilities
- Methods of obtaining information on environmental issues and updates
- Methods of identifying environmental impacts from work related activities
- Meaning of environmental terms - identification, assessment and control of risks, compliance, best practice and sustainable energy
- Procedures in implementing management plans to ensure compliance

T13 Environmental fundamentals encompassing:

- Methods of obtaining updated environmental information and data sheets on the proper use and handling of equipment and materials
- Environmental standards, codes, environmental legislation, OHS legislation, hazardous substances/dangerous goods regulations, supply authority regulations and or enterprise requirements applicable environmental care when handling materials including provision of manufacturers and suppliers information such as material safety data sheets (MSDS)
- Types and application of personal protective equipment used for hazards substances
- Types and application of personal protective equipment used for hazards

REQUIRED SKILLS AND KNOWLEDGE

substances and dangerous goods

- Techniques in handling equipment to eliminate/reduce risks to the environment from spillages of oils, herbicides, pesticides and chemicals from such equipment - vehicle loading crane, chainsaw, enterprise vehicles and explosive power tools
- Procedures for handling and control of spillages of herbicides
- Methods of disposing and storage of herbicides, pesticides and chemicals
- Methods of cleaning mobile plant, equipment and tools
- Recording of data

T14 Substation safety practices encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to substation safety practices
- Techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
- Requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from energised conductors
- Requirements for climbing and working at heights in substations - attached climbing principles, selection, use and operation of elevated work platforms and any OHS requirements associated with the use of EWPs
- Control of small fires - the identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
- Control of oil spills - the identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
- Rescue and release procedures - the rescue personnel from energised conductors, emergency descent from an EWP and may include rescue from confined spaces
- Enterprise requirements - safe access and Authorisation to Work procedures, use of mobile extendable equipment on or near energised HV conductors and emergency response procedures
- Hazards associated with work in substations including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, dangers of near approach to energised conductors

T15 Design principles of high voltage insulation systems encompassing:

- Insulation design principles - common materials used, electrical characteristics, thermal characteristics, uses and applications to substation high voltage plant and equipment, grading, construction and cooling
- Common contaminants and their effects - internal contaminants and external

REQUIRED SKILLS AND KNOWLEDGE

contaminants

- Testing and measurement of insulation quality - test types and common measuring instruments and techniques, resistance and resistivity, losses, measurement errors, temperature corrections and safe work practices related to testing and measurement
- Safety precautions when testing and measuring high voltage insulation systems - safe working practices and procedures, identification of hazards, assessment and control of OHS risks and types, selection, maintenance and use of personal protective equipment

T16 Principles to design zone substation modifications encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the zone substation design principles
- Requirements for the use of zone substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types of designs - substation modification design include replacement of one item or a small quantity of items of primary plant, secondary equipment or SCADA equipment, full or partial retrofit of SCADA into an existing substation
- Types of zone substation primary plant - HV circuit breakers, reclosers, power, current or voltage transformers, disconnectors, surge arrestors, busbars, busbar supports, load control and frequency injection facilities
- Types of secondary equipment - batteries, battery chargers, protection relays, control devices or panels
- Types of SCADA modification - full or part implementation of SCADA retrofits, replacement of SCADA IEDs, RTUs and SMUs

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Completion of six (6) compliant technical designs of different components of a Substation with at least one relating to each of the following project types:	Primary equipment upgrades or replacements Secondary equipment upgrades or replacements SCADA modifications
B	Designs should also included all the following:	Activities that address the correction of errors in designs. Application of a design control checklist which lists all of the required design activities to be carried out in this process.
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual design of substation.

In addition to the resources listed above, in Context of and specific

resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design of substations and may include the following equipment:

Pole (including wood, concrete, steel and composite) associated hardware including conductors (bare wire and aerial bundle cable), crossarms, insulators, ACR, regulator, earthing, air break switches, gas switches, capacitor units, transformers, links, fuses, sectionalisers, lead Arrestors, HV Switchgear, LV Switchgear, control boxes, communications equipment, lanterns, signage, supervisory cable, cable TV, Substations, relevant protection systems and associated civil works.

Substations, transformers, cables, Surge diverters, HV Switchgear, LV Switchgear, links, relays, power supply, signage, busbars, relevant protection systems including fuses and circuit breakers and associated civil works.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation

RANGE STATEMENT

- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design

UETTDRDS45A Organise and implement ESI line and easement surveys

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the surveying of distribution and sub transmission lines and easements for activities associated with the design and installation of electrical equipment. This activity should encompass the use of instruments such as compasses, inclinometer, distance measuring devices, etc and be in accordance with customer requirements, nominated design specifications and company processes.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice**3)**

safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETDRDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure
UETTDREL11A	Apply sustainable energy and environmental procedures

Prerequisite Unit(s) 4)

UETTDREL16A	Working safely near live electrical apparatus
UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan and coordinate the organisation and implementation of line and easement surveys	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the organisation and implementation of line and easement surveys, are reviewed and determined.</p> <p>1.2 Purpose of the line and easement surveys is established and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Organisational established procedures on policies and specifications for the design are obtained or established with the appropriate personnel.</p> <p>1.4 Equipment/tools and personnel protective equipment are selected and coordinated based on specified requirements and established procedures.</p> <p>1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.</p> <p>1.6 Risk control measures are identified, prioritised and evaluated against the work schedule.</p> <p>1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.</p> <p>1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working</p>

ELEMENT	PERFORMANCE CRITERIA
	order.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
	1.12 Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out and coordinate the organisation and implementation of line and easement surveys	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3 Survey project decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4 Mathematical models of the distribution system are used to analyse the effectiveness of the finished project as per requirements and established procedures.
	2.5 Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.

ELEMENT	PERFORMANCE CRITERIA
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
	2.9 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
3 Complete and coordinate the organisation and implementation of line and easement surveys	3.1 Final assessment of the surveys are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
	3.4 Approved copies of survey documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of organising and implementing line and easement surveys

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS45A ESI line and easement surveys

Evidence shall show an understanding of organising and implementing ESI line and easement surveys to an extent indicated by the following aspects:

T1 Fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply and aviation authority regulations and or enterprise requirements applicable to the surveying for an overhead and underground extension
- Techniques in measuring heights and distances
- Techniques in taking bearings angles of deviation using a compass
- Techniques in using a clinometer
- Techniques in recording and storage of data
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
- Techniques in plotting long spans - measuring stick, clinometer, trundle wheel, tapes, correction for sloping ground, distance across objects and range rods
- Techniques in pegging pole positions - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs

T2 Project management encompassing:

- Commonwealth, State and local government legislation, standards, codes, supply authority regulations and or enterprise requirements including relevant certification and licensing applicable to the duties and responsibilities for management a project
- Analyse functions of project management to determine achievement of project objectives
- Relationship of stakeholders to the project
- Techniques in development of project plan - project integration, scope, timelines, cost, quality, resources, communication/protocol requirements, risk/uncertainties and procurement and contacting
- Relationship between project processes, project life and project phases
- Planning and control procedures, resource management and risk management
- Techniques, methodologies and tools available to project managers
- Types of internal and external environmental factors that may affect the project

Evidence Guide

EVIDENCE GUIDE

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Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment

instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables

Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Completion of six (6) surveys of an overhead network relating to the following project types:	<p>Multi-pole extensions (distribution and sub transmission)</p> <p>In-line pole relocations (distribution and sub transmission)</p> <p>Multi circuit overhead lines (distribution and sub transmission)</p> <p>Underground augmentation project.</p>
B	Designs should also included all the following:	<p>Activities that address the correction of errors in the process.</p> <p>Application of a design control checklist which lists all of the required design activities to be carried out in this process.</p>
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a

workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual organisation and implementation of line easement surveys.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the organisation and implementation of line and easement surveys and may include the following:

Survey instruments (theodolites, measuring devices, compasses, inclinometer); survey software

Poles; conductors – bare wire and aerial bundled cable; crossarms; insulators; substations ; transformers; HV switchgear; LV switchgear.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETDRDS46A Develop planned power systems outage strategies

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the competency required to assess, and manage the impact on the network and customers with regards to planned outages. This includes customer outage times, network and plant loading issues and regulatory requirements. A detailed knowledge of Network performance indicators is included.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice**3)**

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEED104A	Use software for engineering applications
UETTDREL16A	Working safely near live electrical apparatus
UETTRDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in

Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

- | | |
|---|--|
| 1 Plan for and coordinate the development of outage strategies | <p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the outage strategies, are reviewed and determined.</p> <p>1.2 Purpose of the outage is established and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Organisational established procedures on policies and specifications for the outage are obtained or established with the appropriate personnel.</p> <p>1.4 Equipment/tools and personnel protective equipment are selected and coordinated based on specified requirements and established</p> |
|---|--|

ELEMENT	PERFORMANCE CRITERIA
	procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved and activities coordinated to carry out work
	1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
2 Carry out and coordinate the development of outage strategies	<p>2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.</p> <p>2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the strategy in accordance with requirements and/or established procedures</p> <p>2.3 Strategy decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures</p> <p>2.4 Mathematical models of the outage strategies are used to analyse the effectiveness of the finished</p>

ELEMENT	PERFORMANCE CRITERIA
	project as per requirements and established procedures
2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the strategy within an agreed timeframe according to requirements.
2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
3 Complete and coordinate the development of outage strategies	3.1 Final review of the strategy is undertaken to ensure it complies with all requirements and include all specifications and documentations needed to complete the project. 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised. 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval 3.4 Approved copies of outage strategy documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing planned outage strategies.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS46A Power systems outage strategies

Evidence shall show an understanding of developing planned power systems outage strategies to an extent indicated by the following aspects:

T1 Working safely on or around electrical equipment through the application of risk management principles and control measures for dealing with non-electrical hazards and extra-low voltage, low-voltage and high-voltage hazards and high-current hazards encompassing:

- Risk management and assessment of risk - principle and purpose of risk management and processes for conducting a risk assessment
- Hazards associated with low-voltage, extra-low voltage and high-currents encompassing:
- Arrangement of power distribution and circuits in an electrical installations
- Parts of an electrical system and equipment that operate at low-voltage and extra-low voltage
- Parts of an electrical system and equipment where high-currents are likely.
- Risks and control measures associated with high-voltage - parts of an electrical system and equipment that operate at high-voltage, the terms 'touch voltage', 'step voltage', 'induced voltage' and 'creepage' as they relate to the hazards of high-voltage and control measures used for dealing with the hazards of high-voltage
- Optical fibre safety - coherent optical sources and joining procedures and Laser safety class 3a devices or their replacement
- Risks and control measures associated with low voltage - risks associated with modifying electrical installations, fault finding, maintenance and repair, control measures before, while and after working on electrical installations, circuits or equipment, isolation and tagging-off procedures, risks and restrictions in working live and control measures for working live
- Risks and control measures associated with harmful dusts and airborne contaminants - thermal insulation, fibrous cement materials and asbestos and other fibre reinforced switchboard materials.
- Safety, selection, use, maintenance and care of test equipment - safety characteristics of electrical testing devices, safe use of electrical testing device and checks and storage methods for maintaining the safety of testing devices

T2 OHS enterprise responsibilities encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Provisions of relevant health and safety legislation
- Principles and practice of effective occupational health and safety management
- Management arrangements relating to regulatory compliance
- Enterprise hazards and risks, control measures and relevant expertise required
- Characteristics and composition of workforce and their impact on occupational health and safety management
- Relevance of enterprise management systems to occupational health and safety management
- Analysis of working environment and design of appropriate occupational health and safety management systems
- Analysis of relevant data and evaluation of occupational health and safety system effectiveness
- Assess resources to establish and maintain occupational health and safety management systems.

T3 Co-ordinating access authority procedures encompassing:

- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and co-ordination encompassing: clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas and responsibilities of members of the team
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
- Techniques in facilitating and co-ordinating the delivery and issuing of access authorities
- Techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific work site, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, regulatory requirements such as Occupational Health and Safety and electrical safety
- Techniques in the receiving and co-ordinating the cancellation of access authorities in readiness for restoration
- Methods of conducting audits on correct access authority procedures
- Process of issuing of other access authorities for work permits - working in confined space, if required, co-ordination of access authorities, engaging and briefing contractors on electrical and other work
- Issue and receipt of operating agreements

T4 Principles of safe design encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority

REQUIRED SKILLS AND KNOWLEDGE

regulations and or enterprise requirements associated with safe design principles

- Particular reference to state and territory regulations regarding: working near energised conductors, electrical access, heights, confined space, testing procedures and Licensing rules
- Application of safe design principles - safe design duty related information, safe design process related information and safe design evaluations

T5 Installation of switchgear and associated equipment encompassing

- Types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques
- Types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- Installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques and pole mounted locations
- Maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry standards and procedures
- Testing and commissioning - electricity supply industry standards and procedures

T6 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment and LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures and personnel protective equipment (PPE) for LV switching

T7 High voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment and network interconnectors source of possible backfeed
- Role of the HV switching operator
- Operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits and purpose and procedure for operational forms, access authorities and permits

REQUIRED SKILLS AND KNOWLEDGE

- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
- Types and categories of HV switchgear
- Application, function and operating capabilities of switchgear
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV transmission main and working earths
- Earthing HV electrical apparatus practices and procedures for access - purposes of “Operational” and additional work part “on-site” earths, factors determining the location and effectiveness of “Operational” earthing, acceptable industry procedures and personal protective equipment
- High voltage switching techniques
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

T8 HV overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to HV overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, use and characteristics and capabilities of specialised tools and testing equipment
- Role and responsibilities of the HV switching operator
- Operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments and purpose and procedure for operational forms, access authorities and hazard/risk assessments
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
- HV switchgear - types, categories, application and operating capabilities
- Operation of HV overhead switching or indicating devices - fuses; disconnect fuses; load switching; live line indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing sticks; phasing tester
- Operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing; HV switching techniques;
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment

instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit is based, shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables

Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Writing of three (3) outage strategies including at least one of each of the following network types:	LV networks HV networks
B	Each of the above outage strategies to include the following:	Switching instructions laid out according to enterprise requirements A documented process to indicate methods used to check switching instructions Documentation of coordination process of switching schedules Documentation of plant loading calculation Initiation of customer notifications according to enterprise requirements Entry of data for collection of 'minute of supply' records into relevant systems
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual development of Planned Outage Strategies

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the development of planned outage strategies and may include the following equipment:

Distribution feeders/networks, zone substation networks, substations, transformers, HV switchgear, LV switchgear, relevant protection systems, (fuses and circuit breakers), switching instructions (applicable to enterprise equipment), computer based systems (applicable to enterprise equipment), network diagrams.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and / or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.
- Safe design principles
- Testing procedure
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Design

UETTDRDS47A Review power system asset management strategies

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the management of assets within the transmission, sub transmission and distribution networks. This includes plant optimisation, condition monitoring, maintenance strategies and policies and capital works planning, including recommendations for continual improvement. Cost benefit analysis is fundamental for successful implementation of the aforementioned asset management functions.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice**3)**

safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus

Prerequisite Unit(s)	4)	
	UETTDARIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDARIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	Testing Pathway Unit Group	
	UEENEED104A	Use engineering applications software on personal computers
	UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
	UEENEEE124A	Compile and produce an energy sector detailed report
	UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDARTS21A	Maintain interdependent network protection and control systems
	UETTDARTS22A	Commission interdependent network protection and control systems
	UETTDARTS29A	Develop power systems secondary isolation instructional documents
	UETTDARTS35A	Maintain complex network protection and control systems
	Design Pathway Unit Group	
	UETTDARDS39A	Prepare and manage detailed construction plans for electrical

Prerequisite Unit(s) 4)

power system infrastructure

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for and coordinate the review and implementation of asset management systems	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence asset management systems, are reviewed and determined.</p> <p>1.2 Purpose of the project is established and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Organisational established procedures on policies and specifications for the design are obtained or established with the appropriate personnel.</p> <p>1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures</p> <p>1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures</p> <p>1.6 Risk control measures are identified, prioritised and evaluated against the work schedule</p> <p>1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures</p> <p>1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order</p> <p>1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved and activities coordinated to carry out work</p> <p>1.10 Site is prepared according to the work schedule and to minimise risk and damage to property,</p>

ELEMENT	PERFORMANCE CRITERIA
	commerce, and individuals in accordance with established procedures
2 Carry out and coordinate the review and implementation of asset management systems	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3 System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4 Mathematical models of the distribution system are used to analyse the effectiveness of the finished project as per requirements and established procedures
	2.5 Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.

ELEMENT	PERFORMANCE CRITERIA
3 Complete and coordinate the review and implementation of asset management systems	<p>3.1 Final review of the project are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project brief.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval</p> <p>3.4 Approved copies of documents are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of reviewing and implementing asset management strategies.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS47A Power system asset management strategies

Evidence shall show an understanding of reviewing power system asset management strategies to an extent indicated by the following aspects:

T1 Principles of safe design encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with safe design principles
- Particular reference to state and territory regulations regarding: working near energised conductors, electrical access, heights, confined space, testing procedures and Licensing rules
- Application of safe design principles - safe design duty related information, safe design process related information and safe design evaluations

T2 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure

T3 Effective management and communication encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to assisting in effective management and communication
- Enterprise operational principles encompassing: workplace OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures and Anti-discrimination policies and procedures
- Relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to OHS training, methods of addressing barriers such as literacy and cultural

REQUIRED SKILLS AND KNOWLEDGE

differences and provisions relating to OHS issue resolution

- Techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management and range of support services and expertise available
- Techniques in managing relationships - identifying problems methods of conflict resolution, methods of consultation, communication, negotiation and mentoring and strategies for positive feedback
- Techniques in leadership in achieving enterprise strategic and operational plans
- Techniques in managing relationships under stress - stress management

T4 Methodology used in writing enterprise specific management reports encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the writing enterprise specific management reports
- Techniques in researching, collating and analysing information for the report - recording, filing, retrieving systems and storing and retrieving data from computer systems
- Relationship of management reports to enterprise policies and procedures - enterprise structure and resources, workplace OHS and risk management enterprise data, financial and operational data, environmental enterprise policies and procedures, industrial relations policies and procedures and Anti-discrimination policies and procedures

T5 Power distribution network documentation encompassing:

- Requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, instruction/worksheets sheets.
- Interpretation of different diagrams and documentation on LV and HV systems - overhead distribution extensions, underground distribution extensions, distribution substation, street lighting system.

T6 Layout principles for overhead distribution encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to overhead distribution layout
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components such as equipment, poles, cross-arms,

REQUIRED SKILLS AND KNOWLEDGE

costings of items and components.

- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards, minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length –
 - Resources needed for the stringing and maintenance of conductors
 - Types of low LV and HV overhead electrical conductor connections
 - Minimum clearances between overhead conductors and low LV and/HV structures
 - Estimation of the duration of overhead distribution extension project

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being

assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit is based, shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated

- environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Correct interpretation of three (3) existing maintenance strategies or policies that relate to electrical network components of the following types:	Lines Substation primary plant Substation secondary equipment Public lighting
B	Preparation of three (3) maintenance strategies or policies that relate to electrical network components of the following types:	Lines Substation primary plant Substation secondary equipment Public lighting
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the

		above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual review of asset management strategies

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the review of asset management strategies and include specific enterprise tools, equipment, information data systems and other resources typical of a workplace.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and / or permits to work

RANGE STATEMENT

- Personnel.
- Quality assurance systems.
- Requirements.
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS48A Analyse and appraise power system fault and outage data

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the data gathering and analysis of system outages and plant failures. It includes the recommending of solutions and maintenance plans to ensure system security.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of

License to practice **3)**
operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETDRDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure
UETDREL11A	Apply sustainable energy and environmental procedures
UETDREL16A	Working safely near live electrical apparatus

Prerequisite Unit(s) 4)

UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for and coordinate the analysis and appraisal of fault and outage data	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the analysis and appraisal of fault and outage data, are reviewed and determined.
	1.2 Purpose of the analysis/appraisal is established and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Organisational established procedures on policies and specifications for the design are obtained or established with the appropriate personnel.
	1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved and activities coordinated to carry out work
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property,

ELEMENT**PERFORMANCE CRITERIA**

		commerce, and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2	Carry out and coordinate the analysis and appraisal of fault and outage data	
	2.1	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2	OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Analysis \ Appraisal decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of solutions for system outages and plant failures are used to analyse the effectiveness of the finished project as per requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.

ELEMENT	PERFORMANCE CRITERIA
	2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
3 Complete and coordinate the analysis and appraisal of fault and outage data	3.1 Final inspections of the analysis/appraisal are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
	3.4 Approved copies of documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of analysing and appraising fault and outage data.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS48A Power system fault and outage data

Evidence shall show an understanding of the analysis and appraisal power system fault and outage data design of power system zone substations modifications to an extent indicated by the following aspects:

T1 Principles of high voltage encompassing:

- Commonwealth/State/Territory legislation, Standards, codes, supply authority regulations and or enterprise requirements associated with working on or near High Voltage
- Electrical and electrostatic principles related to high voltage lines - relationship of current, voltage and resistance as related to transmission lines and relationship of phase voltage and respective line voltages, production of an electric field encompassing: units, effect of distance, potential of an object within the field and the effect of distances to the potential
- HV insulators - construction of a disc insulator, construction of a polymeric insulator, effects of an electrical field on disc insulators, identification of the number of disc insulators needed for a single line voltage, performance of a failed disc insulator on the line and the system, determining the minimum allowable number of discs per string for each line voltage in the system before bare-hand work is to proceed, techniques in detecting a failed disc in a string, techniques in using appropriate tools and equipment to test a string and methods of recording data
- Effects of electrostatic induction on the human body - relationship of the resistance of a human body to different levels of current and voltage, relationship of a human body to an electric field and effects of electrostatic induction on bare-hand work
- Application of Faraday's cage - effects of a body, advantages and description of the Faraday's cage used by bare-hand live-line workers
- Safety precautions working on or near High Voltage electrical apparatus - safe approach distances from live line, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment, permit to work systems and isolation procedures, types and function of specialised live working equipment, safe working policies, procedures and practices when using and operating specialised equipment, methods of using specialised equipment and emergency response and rescue including First Aid etc
- Effects of lightning and switching surges on performance off string insulators -

REQUIRED SKILLS AND KNOWLEDGE

health effects to workers and methods used to alleviate surges on transmission lines

- Magnetic field - difference between magnetic fields and electrostatic fields, source of magnetic field, techniques in locating, measuring and analysing known sources of magnetic fields, reasons for monitoring magnetic field exposure and techniques used to monitor magnetic fields

T2 Electrical equipment associated with protection and control schemes encompassing:

- Types and applications of electrical equipment encompassing characteristics and capabilities - the following schemes, overcurrent, frame leakage, cooling, buchholz, DC supplies, restricted earth, sensitive earth fault, CB fail, reclose, DC frame leakage, CEL Fail, under frequency load shed and earth fault

T3 Installation of switchgear and associated equipment encompassing:

- Types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques
- Types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- Installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques and pole mounted locations
- Maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry standards and procedures
- Testing and commissioning - electricity supply industry standards and procedures

T4 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment and LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures and earthing procedures
- Personnel protective equipment (PPE) for LV switching

T5 High voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and

REQUIRED SKILLS AND KNOWLEDGE

capabilities of specialised tools and testing equipment and network interconnectors
source of possible backfeed

- Role of the HV switching operator
- Operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc strangles
- Types and categories of HV switchgear
- Application, function and operating capabilities of switchgear
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV transmission main and working earths
- Earthing HV electrical apparatus practices and procedures for access - purposes of “Operational” and additional work part “on-site” earths, factors determining the location and effectiveness of “Operational” earthing, acceptable industry procedures and personal protective equipment
- High voltage switching techniques
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

T6 High voltage fault switching principles encompassing:

- Primary causes, effects and types of HV electrical faults
- HV protection devices - main components, types, categories, applications and functions
- Basic principle of operation of HV system protection devices
- Protection co-ordination and protection “zoning”
- HV feeder auto-reclosing suppression - function and application
- Circuit condition requirements and switching considerations when paralleling and separating HV feeders

T7 High voltage distribution transformer principles encompassing:

- Operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer — cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution transformer and associated electrical apparatus faults
- HV underground switching equipment - arc strangles, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers

T8 Feeder automation system encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Function of feeder automation system and the main components
- Operation procedure for a remote field device from a local control station
- Functions of “System Control and Data Acquisition” (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components
- SCADA system security interlocks and access restrictions
- SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciated System and Local Control Station
- Function of the main components of a local/remote control system
- Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciated System and Local Control Station

T9 Methodology in analysing network event records encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority, regulations Standards, codes, and or enterprise requirements applicable to the analysis of critical events
- Requirements for the use of critical event data, manuals, system diagrams/plans and drawings
- Sources of critical event data
- Analyse and assess network event records and relevant data.-the use of event records and data to analyse and develop optimal network restoration strategies taking into account public and employee safety, enterprise reliability guidelines and resource availability
- Safety policies, procedures and precautions related to critical events - Occupational Health and Safety hazards and precautions, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment, checking integrity of the system for minimum disruption, effective communication methods and chain of command and emergency response and rescue including First Aid procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit is based, shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Writing of reports relating to each of the following, recommending relevant action(s):	Zone substation faults Distribution feeders faults Distribution substation faults
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual analysis and appraisal of fault and outage data

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the analysis and appraisal of fault and outage data and may include the following:

Relevant protection systems, both HV and LV (fuses and circuit breakers); distribution feeders/networks (overhead and underground); substations and transformers; HV switchgear; LV switchgear.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and / or permits to work

RANGE STATEMENT

- Personnel.
- Quality assurance systems.
- Requirements.
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design

UETTDRDS49A Establish and manage power system geographical information systems data

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the preparation and updating of detailed plans to be used during the construction phase of all design activities, and utilised by network owners as technical reference materials, to detail system infrastructure. It includes the use of GIS.

Application of the Unit

Application of the Unit 2)

This competency standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government

License to practice

3)

legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEE104A	Use software for engineering applications
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UETTDREL16A	Working safely near live electrical apparatus
UETTRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in

Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
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Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|--|---|
| 1 Plan for and coordinate the establishment and management of geographical information system data | 1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the establishment and management of graphical information systems, are reviewed and determined. |
| | 1.2 Purpose of the geographical information systems is established and expected outcomes of the work are confirmed with the appropriate personnel. |
| | 1.3 Organisational established procedures on policies and specifications for the geographical information systems are obtained or established |

ELEMENT

PERFORMANCE CRITERIA

- with the appropriate personnel.
- 1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures
 - 1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
 - 1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
 - 1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
 - 1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order
 - 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved and activities coordinated to carry out work
 - 1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
- 2 Carry out and coordinate the establishment and management of geographical information system data
- 2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
 - 2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures

ELEMENT	PERFORMANCE CRITERIA
	2.3 Decisions concerning the establishment and management of graphical information systems are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4 Mathematical/engineering models of the establishment and management of geographical information systems are used to analyse the effectiveness of the finished project as per requirements and established procedures
	2.5 Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
3 Complete and coordinate the establishment and management of geographical information system data	3.1 Final review of the establishment and management process are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for

ELEMENT

PERFORMANCE CRITERIA

approval and, where applicable, statutory or regulatory approval

- 3.4 Approved copies of documents regarding the establishment and management process are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of establishing and managing geographical information system data.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS49A Power system geographical information systems data

Evidence shall show an understanding of establishing and managing power system geographical information systems data to an extent indicated by the following aspects:

T1 Drawings, diagrams and schedules used in electrotechnology work encompassing:

- Drawing types and applications: drawing layouts and conventions - mechanical drawings, electrical/electronic schematics, wiring diagrams, PC boards, location diagrams (architectural drawings), cable routes and switching arrangements and building details.
- Drawing symbols - symbols representing electrotechnology circuit components, equipment location and cable routes and control arrangements.
- Cable/wiring/connection and equipment/component/schedules.

T2 Working safely on or around electrical equipment through the application of risk management principles and control measures for dealing with non-electrical hazards and extra-low voltage, low-voltage and high-voltage hazards and high-current hazards encompassing:

- Risk management and assessment of risk - principle and purpose of risk management and processes for conducting a risk assessment
- Hazards associated with low-voltage, extra-low voltage and high-currents - arrangement of power distribution and circuits in an electrical installations, parts of an electrical system and equipment that operate at low-voltage and extra-low voltage and parts of an electrical system and equipment where high-currents are likely.
- Risks and control measures associated with high-voltage - parts of an electrical system and equipment that operate at high-voltage, the terms 'touch voltage', 'step voltage', 'induced voltage' and 'creepage' as they relate to the hazards of high-voltage and control measures used for dealing with the hazards of high-voltage
- Optical fibre safety - coherent optical sources and joining procedures and laser safety class 3a devices or their replacement
- Risks and control measures associated with low voltage - risks associated with modifying electrical installations, fault finding, maintenance and repair, control measures before, while and after working on electrical installations, circuits or equipment, isolation and tagging-off procedures, risks and restrictions in working

REQUIRED SKILLS AND KNOWLEDGE

live and control measures for working live

- Risks and control measures associated with harmful dusts and airborne contaminants: - thermal insulation, fibrous cement materials and asbestos and other fibre reinforced switchboard materials.
- Safety, selection, use, maintenance and care of test equipment - safety characteristics of electrical testing devices, safe use of electrical testing device and checks and storage methods for maintaining the safety of testing devices

T3 OHS enterprise responsibilities encompassing:

- Provisions of relevant health and safety legislation
- Principles and practice of effective occupational health and safety management
- Management arrangements relating to regulatory compliance
- Enterprise hazards and risks, control measures and relevant expertise required
- Characteristics and composition of workforce and their impact on occupational health and safety management
- Relevance of enterprise management systems to occupational health and safety management
- Analysis of working environment and design of appropriate occupational health and safety management systems
- Analysis of relevant data and evaluation of occupational health and safety system effectiveness
- Assess resources to establish and maintain occupational health and safety management systems.

T4 Installation of overhead distribution conductors encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length.
- Constructions types and structures for distribution and sub transmission lines
- Types, sizes and characteristics of overhead conductors
- Resources for the stringing and maintenance of conductors - types of low and high voltage overhead electrical conductor connections, causes and effects of poor electrical connections, reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors, minimum clearances between overhead conductors and low and high voltage structures.
- Techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of low and high voltage conductors.

T5 Electrical equipment fundamentals used in the powerline industry encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment. Note examples of electrical equipment will vary according to the enterprise but

REQUIRED SKILLS AND KNOWLEDGE

encompass both HV and LV equipment

- Characteristics, capabilities and application of powerline electrical equipment
- Safety precautions with regards to using electrical equipment
- Techniques in pre-use inspection on the serviceability of electrical equipment
- Techniques in the general maintenance, and care and storage of electrical equipment
- Identifying hazards, assessing and controlling risks associated with their the use of electrical equipment

T6 Principles of safe design encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with safe design principles
- Particular reference to state and territory regulations regarding: working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- Application of safe design principles - safe design duty related information, safe design process related information and safe design evaluations

T7 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T8 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure

T9 Procedures for the location and rectification of faults in electrical equipment up to 1000 volts AC and or 1500 volts DC, encompassing:

- Relationship of Occupational Health and Safety to the location and rectification of faults in electrical equipment - Act and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency First Aid/resuscitation, rescue from a live electrical situation and

REQUIRED SKILLS AND KNOWLEDGE

enterprise policies and procedures

- Types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment and fault-finding techniques and procedures
- Fundamental electrical concepts - effects of current, practical resistors, sources of EMF, series, parallel and series-parallel circuits, electrical measurement, capacitors, inductors and magnetism
- Fundamentals of general appliances - basic principles of appliances (non mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures including continuity, fault types in appliances and fault-finding procedures (prescriptive)
- Fundamentals of single phase induction motors - basic principles of operation (non mathematical), motor identification, motor ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedure including continuity, fault types in “phase splitting” and universal type motors and fault-finding procedures (prescriptive)
- Fundamentals of three phase induction motors - basic principles of operation (non mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedure and fault-finding procedures (prescriptive)
- Fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedure and fault-finding procedures (prescriptive)

T10 Geographic Information Systems principles encompassing:

- Standards, codes, supply authority regulations and or enterprise requirements associated with the use of geographic information systems
- Requirements for the use of system manuals, system diagrams/plans and drawings
- Techniques in system use - system structure, preparation of data, methods of data entry, methods of accessing data, linking to other databases and output options

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit is based, shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Completion of GIS records relating to six (6) distribution or subtransmission network relating to the following project types:	Overhead extensions (distribution or sub transmission) Underground extensions (distribution or sub transmission) Substation construction (distribution or sub transmission)
B	Projects should also include all the following:	Any preparation and updating of detailed construction drawings of distribution and sub transmission networks The use of a GIS.
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual establishment and management of geographical information system data

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the establishment and management of geographical information systems and may include the following equipment:

Geographical information system, computer aided drafting software, construction drawings, design sketches and as built drawings.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and / or permits to work

RANGE STATEMENT

- Personnel.
- Quality assurance systems.
- Requirements.
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design

UETTDRDS50A Design customer power system substations

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This competency standard unit covers the design of basic primary and secondary plant within a customer substation. Such designs will usually include relay-operated HV switchgear, distribution transformers, LV switchgear, including customer distribution boards. The design may include minor civil engineering aspects and must conform to relevant Australian standards, safety regulations, environmental standards and customer requirements taking into account costs as an important criterion.

Application of the Unit

Application of the Unit 2)

This competency standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training..

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice**3)**

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus
UETTDRL62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTDRL63A	Implement and monitor the power

Prerequisite Unit(s)	4)	system environmental and sustainable energy management policies and procedures
		Pathway Unit Group 1
	UEENEEE104A	Solve problems in d.c. Circuits
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UETTDRDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure
	UETTDRDS45A	Organise and implement ESI line and easement surveys
		Pathway Unit Group 2
	UEENEEE104A	Solve problems in d.c. Circuits
	UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDRDS43A	Develop high voltage and low voltage distribution protection systems
		Pathway Unit Group 3

Prerequisite Unit(s) 4)

UETDRDS44A Design power system zone substations modifications

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for and coordinate the design of customer substations	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of customer substations, are reviewed and determined.</p> <p>1.2 Purpose of the design is established and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Organisational established procedures on policies and specifications for the design are obtained or established with the appropriate personnel.</p> <p>1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures</p> <p>1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures</p> <p>1.6 Risk control measures are identified, prioritised and evaluated against the work schedule</p> <p>1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures</p> <p>1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order</p> <p>1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved and activities coordinated to carry out work</p> <p>1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with</p>

ELEMENT	PERFORMANCE CRITERIA
	established procedures
2 Carry out and coordinate the design of customer substations	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3 Substation design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4 Mathematical models of the customer substation are used to analyse the effectiveness of the finished project as per requirements and established procedures
	2.5 Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.

ELEMENT	PERFORMANCE CRITERIA
3 Complete and coordinate the design of customer substations	<p>3.1 Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval</p> <p>3.4 Approved copies of design documents are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing customer substations.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS50A Customer power system substations - Design

Evidence shall show an understanding of designing customer power system substations to an extent indicated by the following aspects:

T1 Substations and power transformers encompassing:

- Relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
- Characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling
- Auxiliary equipment used on transformers - function and basic operation
- Maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault finding procedures
- Characteristics of a reactors - description and purpose

T2 Installation of metering and control equipment encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
- Types of meters - kilowatt-hour meters single and polyphase, demand meters, recording meters and electronic recording metering systems summators
- Installation and removal methods - direct connection and plug in method, enterprise specific
- Types of associated equipment and accessories - meter boards, service fuse, links, contactors, time switch, audio frequency injection relay
- Testing procedures - safety and polarity testing

T3 High voltage distribution transformer principles encompassing:

- Operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer — cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution

REQUIRED SKILLS AND KNOWLEDGE

transformer and associated electrical apparatus faults

- HV underground switching equipment - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers

T4 Feeder automation system encompassing:

- Function of feeder automation system and the main components
- Operation procedure for a remote field device from a local control station
- Functions of “System Control and Data Acquisition” (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components
- SCADA system security interlocks and access restrictions
- SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciated System and Local Control Station
- Function of the main components of a local/remote control system
- Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciated System and Local Control Station

T5 Layout principles for a distribution substation minor upgrade encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to a distribution substation minor upgrade
- Requirements for the use of distribution substation minor upgrade construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components and equipment, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards, minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length
- Resources needed for the laying of conductors, cables and equipment
- Determining the appropriate installation sequence
- Minimum clearances between conductors and equipment
- Estimation of the duration of underground distribution extension project

T6 Fundamentals of distribution transformers encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the safe operation and testing of distribution transformers and auxiliary equipment
- Drawing layouts, conventions and symbols - vector group of transformers and three phase transformers
- Construction of a distribution transformer
- Characteristics when operated under load and no load conditions

REQUIRED SKILLS AND KNOWLEDGE

- Percentage impedance determinations by test and calculation
- Function and operation of tap charging switches including solid state tap changing equipment
- Function and operation of transformer auxiliary equipment
- Problems caused by harmonics in transformers
- Methods and equipment used to overcome harmonics in transformers

T7 Testing procedures of distribution transformers encompassing:

- Safety precautions specific to the testing of distribution transformers
- Procedures for safely connecting distribution transformers for testing
- Testing of distribution transformers to determine losses
- Calculation of transformer's efficiency
- Methods and types of equipment used to cool transformers - properties of transformer oil and tests performed on transformer oil
- Techniques in performing selected tests on transformer oil
- Techniques in performing testing procedures on armer
- Techniques in testing distribution transformers
- Distribution transformer parallel connections - conditions and restrictions for parallel operations and calculations of loading on transformers operating in parallel
- Connection of transformer in parallel to supply a common load

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for

apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit is based, shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Completion of six (6) designs in total drawn from at least two (2) of the following project types:	Single transformer substation Multi-transformer substations Upgrade/alteration to existing assets Auto-changeover systems
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate

		solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual design of customer substations.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of

learning and assessment effort being concurrently managed.

Range Statement

RANGE STATEMENT

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design of customer substations and may include the following:

Substations, transformers, HV switchgear, LV switchgear, relevant protection systems, (fuses and circuit breakers), civil works, customer distribution boards.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and / or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.
- Safe design principles
- Testing procedures

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design

UETTDRDS51A Manage power system transmission and sub-transmission design process

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the management of transmission, sub-transmission and zone substation design process activities. This applies to all design projects whether they be basic secondary upgrades, SCADA modifications or new installations on green field sites. The design and management must conform to safety regulations and environmental standards and incorporate the principles of safe design.

Application of the Unit

Application of the Unit 2)

This competency standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETTD RDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure
UETTDREL11A	Apply sustainable energy and environmental procedures

Prerequisite Unit(s) 4)

UETTDREL16A	Working safely near live electrical apparatus
UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for and coordinate the management of the transmission, sub-transmission and zone substation design process	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of substations, are reviewed and determined.
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Established policies, procedures and specifications for the design are obtained or established with the appropriate personnel.
	1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources including personnel, equipment, tools and personal protective equipment required for

ELEMENT

PERFORMANCE CRITERIA

		the job are identified, scheduled and coordinated and confirmed in a safe and technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
2	Carry out and coordinate the management of the transmission, sub-transmission and zone substation design process	
	2.1	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2	OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the system are used to analyse the effectiveness of the finished project as per requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it

ELEMENT

PERFORMANCE CRITERIA

- with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
- 2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 3 Complete and coordinate the management of the transmission, sub-transmission and zone substation design process
- 3.1 Final checks of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
- 3.4 Approved copies of design documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of managing transmission, sub-transmission and zone substation design process.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS51A Power system transmission and sub-transmission design process

Evidence shall show an understanding of managing the power system transmission and sub-transmission design process to an extent indicated by the following aspects:

T1 Working safely on or around electronic equipment encompassing:

- Risk management and assessment of risk - principle and purpose of risk management and processes for conducting a risk assessment
- Hazards associated with low-voltage, extra-low voltage and high-currents - parts of an electronic systems and equipment that operate at low-voltage and extra-low voltage and parts of an electronic systems and equipment where high-currents are likely
- Risks and control measures associated with high-voltage - parts of an electronic systems and equipment that operate at high-voltage, the terms used - 'touch voltage', 'step voltage', 'induced voltage' and 'creepage' as they relate to the hazards of high-voltage and control measures used for dealing with the hazards of high-voltage
- Risks and control measures associated with low voltage - risks associated with installation, fault finding, maintenance and repair, control measures before, while and after working on electronic systems or equipment, isolation and tagging-off procedures, risks and restrictions in working live and control measures for working live
- Risks and control measures associated with the high levels of radiation encompassing: RF hazards, maximum exposure levels to RF and maximum exposure to microwave radiation
- Optical fibre safety - coherent optical sources and joining procedures and laser safety class 3a devices or their replacement
- Safety, selection, use, maintenance and care of test equipment - safety characteristics of electrical testing devices, chemical cleaning solvents, glues and joining wastes used in electronics, safe use of electrical testing device and checks and storage methods for maintaining the safety of testing devices

T2 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed

REQUIRED SKILLS AND KNOWLEDGE

- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be Installed
- Control equipment and auxiliary relays, flags and alarms
- Techniques in evaluating serviceability of equipment to be installed
- Safety precautions when testing and measuring equipment to be installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols and safe working clearances
- Remote and local operating principles and conventions

T3 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure

T4 Enterprise specific procedures and work practices relating to critical events encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the procedures and work practices relating to critical events
- Requirements for the use of operational manuals, system diagrams/plans and drawings
- Identify and interpret enterprise operating procedures
- Techniques in the applying enterprise operating procedures

T5 Effective management and communication encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to assisting in effective management and communication
- Enterprise operational principles - workplace OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures, Anti-discrimination policies and procedures
- Relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to OHS training, methods of addressing barriers such as literacy and cultural

REQUIRED SKILLS AND KNOWLEDGE

differences and provisions relating to OHS issue resolution

- Techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management and range of support services and expertise available
- Techniques in managing relationships - identifying problems, methods of conflict resolution, methods of consultation, communication, negotiation and mentoring and strategies for positive feedback
- Techniques in leadership in achieving enterprise strategic and operational plans
- Techniques in managing relationships under stress - stress management

T6 Methodology used in writing enterprise specific management reports encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the writing enterprise specific management reports
- Techniques in researching, collating and analysing information for the report - recording, filing, retrieving systems and storing and retrieving data from computer systems
- Relationship of management reports to enterprise policies and procedures - enterprise structure and resources, workplace OHS and risk management enterprise data, financial and operational data, environmental enterprise policies and procedures, industrial relations policies and procedures and anti-discrimination policies and procedures
- Techniques in writing enterprise specific management reports - methods used to disseminate information and facilitate enterprise requirements, document proformas and compliance and legislative requirements to produce effective reports in the appropriate format

T7 Enterprise specific procedures and work practices relating to managing critical events encompassing:

- Commonwealth/State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the procedures and work practices relating to managing critical events
- Requirements for the use of critical event manuals, system diagrams/plans and drawings
- Identify and interpret enterprise critical event management procedures
- Techniques in the applying enterprise critical event management procedures

T8 Procedure to undertake a visual inspection of a scheme encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with visual inspection procedures of a scheme
- Requirements for the use of manuals, system diagrams/plans and drawings
- Identify obvious deficiencies in operating to the standard functionality
- Techniques in determining relay malfunction - targeting and techniques in

REQUIRED SKILLS AND KNOWLEDGE

determining wiring defects

T9 Types, uses and techniques when using the tools and equipment associated with substation encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the use of high voltage or high current test equipment associated with substation
- Safety precautions when using tools and equipment on substations - safe operation procedures, Occupational Health and Safety hazards and precautions, identification of hazards, assessing and controlling risks, types, selection, maintenance and uses of personnel protective equipment, permit to work systems and isolation procedures, safe working practices when using specialised equipment and emergency response and rescue including First Aid etc
- Techniques in the use of tools and equipment associated with substations – recorders, oscilloscopes, real time recorders, storage recorders, data loggers and chart recorders.
- Measurements - harmonics, transient capture and point-on-wave assessment and insulation test instruments (digital, analogue instruments up to 5 kV DC and 10 kV AC). Techniques include Guarding and shielding. Measurements of polarisation index, step voltage methods with appropriate temperature correction, dielectric dissipation factor on grounded and ungrounded objects
- Meters and the techniques used to carry out measurements - temperature, winding resistance, conductor resistance, capacitance and inductance, phase angle, frequency, ratio and phase shift and vector group
- Timing measurement tools - sequence timers, event timers, contact timers. Measurements on circuit breakers and other interrupter types may include close-open, open-close, close-open-close, open-close-open sequences
- Equipment used- chain blocks, tension devices, power hand tools, slings and hoists, hydraulic crimping tools, elevated work platforms and other mobile plant used to gain access to work at height, appropriate hand tools and other mechanical instruments: note examples include oscilloscopes, real time recorders, storage recorders, data loggers and chart recorders. Measurements may include harmonics, transient capture and point-on-wave assessment

T10 Negotiation techniques encompassing:

- Techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management and range of support services and expertise available
- Techniques in managing relationships - identifying problems, methods of conflict resolution, methods of consultation, communication, negotiation and mentoring and strategies for positive feedback
- Techniques in client interaction - relationships between client and enterprise, outcomes of the interaction and methods of achieving outcomes

T11 Preparation of policies and procedures encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority

REQUIRED SKILLS AND KNOWLEDGE

regulations Standards, codes, and or enterprise requirements applicable to the preparation of policies and procedures

- Types of standard forms, documentation and data
- Techniques in disseminating policies and procedures
- Techniques in undertaking approval processes

T12 Principles to manage the process of transmission, sub-transmission and zone substation designs encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the substation design management principles
- Requirements for the use of the substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Type of design management - design commencement, carrying out and completion activities
- Types of design process commencement activities - acquisition of site survey, acquisition of geotechnical and resistivity details, completion of environmental considerations, acquisition of design project scope documents, component manufacturer's details, engagement of necessary consultants/contractors
- Types of design carrying out activities - completion of checklists, signoff of checklists, general design administration/housekeeping activities
- Types of design process completion activities - the issue of design documentation to allow construction, closure of the design process, carrying out of the post delivery review and implementation of corrective actions, issue of corrected design documents reflecting field mark ups

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit is based, shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	The design process commencement activities, and to include each of the	Completion of site survey. Geotechnical and

	following items:	<p>resistivity details.</p> <p>Completion of environmental considerations</p> <p>Acquisition of design project scope document</p> <p>Component manufacturer's details.</p> <p>Engagement of necessary consultants / contractors.</p>
B	The design process completion activities, and to include each of the following items:	<p>Issue of design documentation to allow construction.</p> <p>Closure of the design process post delivery review and implementation of corrective actions.</p> <p>Issue of corrected design documents reflecting field mark ups.</p>
C	The two technical projects to include all the following:	<p>Activities that address the correction of errors in the process.</p> <p>Application of a design control checklist, which lists all of the required design activities to be carried out in this process.</p>
D	At least one occasion	<p>Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.</p>

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual management of the transmission, sub-transmission and zone substation design process

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design housekeeping/management components of transmission, sub-transmission and zone substation design projects.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and / or permits to work
- Personnel.
- Quality assurance systems.

RANGE STATEMENT

- Requirements.
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS52A Design power system transmission, sub-transmission and zone substation buildings

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the design of transmission, sub-transmission and zone substation buildings. This may include basic augmentations or new installations on green field sites. The design must conform to safety and building regulations and environmental standards and incorporate the principles of safe design.

Application of the Unit

Application of the Unit 2)

This competency standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

License to practice

3)

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENE EG101A	Solve problems in electromagnetic devices and related circuits
UEENE EG102A	Solve problems in electromagnetic devices and related circuits
UETTD RDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure
UETTD RDS44A	Design power system substations modifications
UETTD REL11A	Apply sustainable energy and

Prerequisite Unit(s) 4)

	environmental procedures
UETTDREL16A	Working safely near live electrical apparatus
UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|--|--|
| 1 Plan for and coordinate the design of transmission, sub-transmission and zone substation buildings | 1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of substations buildings, are reviewed and determined. |
| | 1.2 Purpose of the design is established and expected outcomes of the work are confirmed with the appropriate personnel. |
| | 1.3 Established policies, procedures and specifications for the design are obtained or established with the appropriate personnel. |
| | 1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures |
| | 1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures |
| | 1.6 Risk control measures are identified, prioritised and evaluated against the work schedule |
| | 1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures |
| | 1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated |

ELEMENT

PERFORMANCE CRITERIA

- and confirmed in a safe and technical working order
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved and activities coordinated to carry out work
 - 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
 - 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
- 2 Carry out and coordinate the design of transmission, sub-transmission and zone substation buildings
- 2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
 - 2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
 - 2.3 System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
 - 2.4 Mathematical models of the system are used to analyse the effectiveness of the finished project as per requirements and established procedures
 - 2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
 - 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure

ELEMENT

PERFORMANCE CRITERIA

- completion of the project within an agreed timeframe according to requirements.
- 2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
- 2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 3 Complete and coordinate the design of transmission, sub-transmission and zone substation buildings
- 3.1 Final checks of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
- 3.4 Approved copies of design documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing transmission, sub-transmission and zone substation buildings.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS52A Power system transmission, sub-transmission and zone substation buildings

Evidence shall show an understanding of designing power system transmission, sub-transmission and zone substation buildings to an extent indicated by the following aspects:

T1 Electrical power circuit analysis encompassing:

- Superposition theorem
- Kirchhoff's laws
- Mesh analysis
- Thevenin's & Norton's theorems
- Maximum power transfer theorem
- Complex impedance
- Frequency domain
- Transients

T2 Identification of basic concepts, principles and applications - Application of velocity, acceleration, force, density, torque, and pressure encompassing:

- Applications of the SI units
- The relationship between work, power and energy
- Behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- Fundamentals of the basic laws of fluid mechanics.

T3 Principles to light design layout encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the light design principles
- Requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types of tariffs and charges
- Types of street lighting components - column types, foundations, brackets, luminaries and mounting heights

REQUIRED SKILLS AND KNOWLEDGE

- Types of electrical street lighting circuits - types of supply, lighting circuit and control circuit
- Fundamentals of lighting production - electromagnetic spectrum, visible and non-visible radiation, spectral energy distribution, infra-red, ultra-violet, radiation-safety, incandescence and phosphorescence, reflection and refraction.
- Fundamentals of lighting concepts - terms and units, purpose of reflectors and diffusers.
- Factors affecting external lighting design
- Calculation of light output
- Determining illuminance - point to point method, lumen method
- Determining rated life of luminaries
- Fundamentals of street lighting design
- Considerations for special lighting situations - security lighting, hazardous street locations, and emergency lighting.

T4 Layout principles for underground mains distribution extension encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to underground mains distribution extension
- Requirements for the use of underground mains construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components and equipment, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards, minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length
- Resources needed for the laying of conductors
- Determining the appropriate excavation for the location
- Determining the size and depth of excavation
- Determining the trench and pit layout procedures
- Minimum clearances between conductors
- Estimation of the duration of underground distribution extension project

T5 Principles of transmission, sub-transmission and zone substation building designs encompassing

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the substation design management principles
- Requirements for the use of the substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types of building designs - fixed and/or portable control, switchgear, frequency

REQUIRED SKILLS AND KNOWLEDGE

injection and miscellaneous building designs

- Types of building floor construction - concrete poured in situ, precast, elevated ultra floor beams with poured in situ slab, pre-manufactured steel framed floor
- Types of building walls construction - steel framed, masonry, precast tilt-up, steel framed and lined
- Types of roof construction - steel framed, sheet steel clad
- Parameters to be considered - establishment of equipment dimensions, weights and dynamic loadings, suitability of building room/compartments and door opening dimensions for the equipment to be housed, compliance with security, fire rating and safety, pressure relief, BCA and BA requirements, compliance with electrical requirements, i.e. frame leakage, earthed metal isolation, appropriateness of floor reference levels, provision of cable supports, penetrations and pulling ring requirements, building light and power design and drafting

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit is based, shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an

extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and

- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Completion of two (2) compliant technical designs including each of the following:	<p>Establishment of equipment dimensions, weights and dynamic loadings.</p> <p>Suitability of building room/compartments and door opening dimensions for the equipment to be housed.</p> <p>Compliance with security, fire rating and safety, pressure relief, BCA and BA requirements.</p> <p>Compliance with electrical requirements, i.e. frame leakage, earthed metal isolation.</p> <p>Appropriateness of floor reference levels.</p> <p>Provision of cable supports, penetrations and pulling ring</p>

		requirements. Building light and power design and drafting.
B	Designs should also include all the following:	Activities that address the correction of errors in the process. Application of a design control checklist which lists all of the required design activities to be carried out in this process.
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual design of transmission, sub-transmission and zone substation buildings.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design housekeeping components of transmission, sub-transmission and zone substations and may include the following equipment:

Primary components of a substation which may include: Electrical equipment in accordance with SLD, bays spaced in accordance with standard requirements, switchyard design in accordance with AS2067, equipment spaced so that space is available for maintenance facilities, maintenance space to fence in accordance with AS2067, switchyard equipment device codes correct, busbar earthing facilities available in appropriate positions, earth switches fitted to high busbar, portable earth attachment points in correct position, connections, busbar and flexibles, earthing points, switchgear operating handle positions, disconnecter operator earth mats, anti-vibration Pads and Transformer location, auxiliary transformer location, earth stick storage, control building equipment layout, H.V. cable layout, wiring/connection diagrams, cable schedule, pilot terminations, streamline filter supply, frame leakage CT's, VT 's and CT's, photo electric cells, earthing of plumbing, distribution feeder cable CB connection and route drawing produced by regional designer and checked.

Manufacturer's data sheets, documents, drawings

Manufacturers' recommendations; Reliability performance profiles; Knowledge of local history and experience; Consultation with other Authorities; Environmental influences; Present practices.

Equipment includes; Sectionalisers, air break switches, capacitor banks, transformer taps, metering and protection equipment, data communication systems

Primary and secondary voltage and current injection equipment; time delay measuring equipment; Current transformers; Voltage transformers; Power transformers; Tapchangers; Circuit breakers; Capacitor banks; Ring main units; Audio frequency load control; Circuit breaker auxiliary systems; Substation and metal structure earthing systems; SCADA interfaces and transducer inputs; local opto-isolated alarms; PLC programs; Auto Reclosers (ACRs); protection relays; metering; control circuits; Statistical metering systems; Frame leakage relays; Distance relays; Pilot wire relays; Transformer differential relays; Busbar differential relays; Impedance bus zone relays; Overcurrent and earth fault relays; Transformer neutral check relays; Circuit breaker fail relays; Multi-trip relays; Auto recloser relays; Voltage transformer failure relays; Surge protection relays; Buchholz relays; Winding temperature relays; Sensitive earth fault relays; Phase failure relays; Frequency relays; Load shedding relays; General protection LV devices; Oil temperature protection devices; Oil surge protection devices; Power supplies. differential relays; power systems; multi-faceted schemes; interactive overload schemes, distance protection (incorporating relay selection, switched/non-switched schemes; mutual coupling and teed feeder systems); protection signalling (incorporating series, direct, permissive, distance acceleration, block

RANGE STATEMENT

interruption); telecommunication circuits and equipment.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and / or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Design

UETTDRDS53A Design power system transmission and sub-transmission substation primary plant

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the design of transmission, sub-transmission and zone substation primary plant. This may include busbar upgrades, equipment replacement projects or new installations on green field sites. The design must conform to safety regulations and environmental standards and incorporate the principles of safe design.

Application of the Unit

Application of the Unit 2)

This competency standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice

3)

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETTD RDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure
UETTD RDS44A	Design power system substations modifications

Prerequisite Unit(s) 4)

UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus
UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|---|---|
| 1 Plan for and coordinate the design of transmission, sub-transmission and zone substation primary plant | 1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of primary plant component of substations, are reviewed and determined. |
| | 1.2 Purpose of the design is established and expected outcomes of the work are confirmed with the appropriate personnel. |
| | 1.3 Established policies, procedures and specifications for the design are obtained or established with the appropriate personnel. |
| | 1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures |
| | 1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures |
| | 1.6 Risk control measures are identified, prioritised and evaluated against the work schedule |
| | 1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures |
| | 1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated |

ELEMENT

PERFORMANCE CRITERIA

		and confirmed in a safe and technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
2	Carry out and coordinate the design of transmission, sub-transmission and zone substation primary plant	
	2.1	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2	OHS and sustainable energy principles, functionality and practices to avoid incidence and accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the design are used to analyse the effectiveness of the finished project as per requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure

ELEMENT

PERFORMANCE CRITERIA

- completion of the project within an agreed timeframe according to requirements.
- 2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
- 2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 3 Complete and coordinate the design of transmission, sub-transmission and zone substation primary plant
- 3.1 Final checks of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
- 3.4 Approved copies of design documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing transmission, sub-transmission and zone substation primary plant.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS53A Power system transmission and sub-transmission substation primary plant

Evidence shall show an understanding of designing power system transmission and sub-transmission substation primary plant to an extent indicated by the following aspects:

T1 Materials properties encompassing:

- Identification and classification of engineering materials material properties
- Types and applications - properties of tensile strength, effects of temperature on the expansion of metals, ductility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers.

T2 Principles of power transformer construction and operations encompassing:

- Transformer types; note examples include shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step down transformers, transmission and generation types
- Reactor types - shunt and series, applications and design considerations
- Iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
- Winding configurations and construction techniques - helical, spiral, disc, interleaved disc types
- Insulation methods and techniques - fully insulated windings and graded insulation techniques, oil filled and gas filled power transformers
- Transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, impedance percent
- Nameplate details - BIL, tapping winding detail, physical layout, cooling ratings, physical details
- Transformer and reactor cooling types and their effects on design and rating
- Transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
- Winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
- Operating constraints as single units and in parallel
- Tapping windings encompassing: placement issues, tapping range and OLTC versus off load TC techniques - high speed resistor, reactor and vacuum types,

REQUIRED SKILLS AND KNOWLEDGE

Jansen mechanisms, dead tank and live tank types

- Control system characteristics
- High voltage bushing selection - insulation system used, rating, BIL, selection criteria and testing considerations

T3 Principles of power transformer construction and operations encompassing:

- Applications of static reactive plant in high voltage networks, including voltage control, VAR control, transient response capacity
- Types of static reactive plant including high voltage capacitors, high voltage reactors, static VAR compensators and combinations of these
- Operating characteristics and operational constraints including point on wave switching issues
- Ratings, cooling systems and control systems and ancillary equipment used
- Configurations and system layout including single star, double star, bridge type
- Typical protection systems used including neutral unbalance current, neutral unbalance voltage
- Techniques used when balancing elements within static reactive plant
- Safety precautions when testing and maintaining high voltage static reactive plant - safe working practices and procedures, identification of hazards, assessment and control of OHS risks and types, selection, maintenance and use of personal protective equipment

T4 Principles of power transformer high speed on load tap changers encompassing:

- Selector types and applications for high voltage power transformers
- Diverter switch types and applications for high voltage power transformers including live tank, dead tank, resistor type, reactor type, vacuum type, pennant flag, pennant cycle
- Ratings and construction principles
- Operating mechanism types, stored energy systems and associated control systems
- Operating principles and operating sequences of selectors and diverters
- Measurement requirements including contacts, differential wear, transition resistors and transient protection devices, rotation lag, out of sequence controls and end-of-life unit and component assessment
- Online diagnostic tools and devices
- Ancillary equipment including online filters, over pressure relays and devices
- Testing requirements including cycle timing, differential delay, energy accumulator mechanical and operational tests and control system functional tests
- Safety precautions when testing and maintaining high voltage power transformer on load tap changers - safe working practices and procedures, identification of hazards and assessment, control of OHS risks and types, selection, maintenance and use of personal protective equipment

T5 Substation switching practices encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to substation switching
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be switched
- Procedures for obtaining correct HV switching authorisation - identification of hazards and controlling risks, safety procedures and precautions, responsibilities and protocols and identifying switching resources
- Techniques in HV substation switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and commissioning procedures
- Use, care and operation of equipment associated with HV substation equipment - test instruments and sticks
- HV switchgear encompassing: types, categories, application and operating capabilities
- Basic Operation of protection systems
- Restrictions pertaining to HV substation switching equipment
- Restrictions pertaining to Enterprise Specific procedures

T6 Circuit breaker construction principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to circuit breakers
- Requirements for the use of manuals, circuit breaker diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation circuit breakers installed
- Use, characteristics and capabilities of specialised tools and equipment
- Identification of components within the circuit breaker and associated control housings
- Identification of energy sources within the circuit breaker and associated control housings
- Identification of insulation paths within the circuit breaker
- Types and characteristics of operating mechanisms
- Types and characteristics of interrupter chambers
- Safety precautions when Constructing circuit breakers - safe working practices and procedures, identification of hazards, assessment and control of OHS risks and types, selection, maintenance and use of personal protective equipment

T7 Synchronous Condenser Principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Synchronous Condensers
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of Synchronous Condensers installed
- Identification of components within the Synchronous Condensers and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment

REQUIRED SKILLS AND KNOWLEDGE

- Enterprise Specific Policies and Procedures for Synchronous Condensers
- Techniques in evaluating serviceability of Synchronous Condensers operation
- Safety precautions when testing and measuring Synchronous Condensers - safe working practices and procedures, Identification of hazards and assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols and safe working clearances
- Communicating worksite procedures

T8 Commissioning procedures associated with relevant equipment encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures - planning, policy, testing techniques and close out requirements

T9 Detailed operation of instrument transformers encompassing:

- Voltage and current transformer principles and terminology
- Types and classes of current transformers
- Constructions of current transformers
- Characteristics of current transformers
- Testing of current transformers
- Types and categories of voltage transformers
- Constructions of voltage transformers
- Characteristics of voltage transformers
- Testing of voltage transformers

T10 Detailed operation of metering devices and principles encompassing:

- Common circuit configurations
- Meters and measurement principles
- Instrument transformer application
- Testing of metering systems and devices
- Implications of market operation

T11 Detailed operation of communication devices and principles encompassing:

- Types of communication systems
- Interface to power system equipment
- Hardware configurations
- Testing of communication links

T12 Primary Plant testing encompassing:

- Transformers - DC high voltage tests, AC high voltage tests, induced high voltage tests, ratio tests, polarity tests, winding resistance tests, impedance tests, insulation

REQUIRED SKILLS AND KNOWLEDGE

resistance tests, transformer vector group test, winding temperature indicator test, alarm tests, neutral ct tests

- Circuit breakers - DC high voltage tests, AC high voltage tests, induced high voltage tests, function tests, operation timing, minimum voltage operation test, insulation resistance test, contact resistance test, auxiliary contact test, alarm tests
- Capacitor banks - DC high voltage tests, AC high voltage tests, induced high voltage tests, neutral ct tests, balance tests, insulation resistance

T13 Effects of harmonics encompassing:

- Characteristics and effects of harmonics on protection device functions/malfunction
- Effects of harmonics on the following: transformers, generators motors and quality of supply

T14 Basic design features and characteristics of underground cables, lines, poles/structures and associated equipment and or components encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment
- Overhead lines characteristics - type of components, characteristics of conductor material, mechanical limitations and physical dimensions of lines, current rating factors (heating, voltage drops, power losses) of conductors, aerial bundled cables (HV and LV), covered conductors.
- Characteristics and constructional features of poles and structures - types of poles and structures, characteristics of poles/structure materials, mechanical limitations of poles/structures, footings and additional support techniques.
- Characteristics and constructional features of underground cables - underground cables constructional features, insulation materials and abbreviations, cable dielectrics, electric stress, cable voltage drop.
- Calculation of cable volt drop in relation to length of cable run
- Techniques in reducing electrical stress on cables
- Cable rating factors
- Methods of joining and terminating cables
- Techniques in the installation of cables above and below ground
- Techniques in cable testing and the location of cable faults
- Techniques in cable drawing.

T15 Power test equipment testing encompassing:

- Safety precautions specific to the use and connection of power test equipment
- Meter operational principles; note examples include moving coil, moving iron, transducer, digital and analogue
- Types, operation and use of meters - phase sequence meters, phase angle meters, instrument transformers, wattmeters, energy meters, phase system analysers, power oscilloscopes and frequency meters

T16 Principles of transmission, sub-transmission and zone substation primary plant

REQUIRED SKILLS AND KNOWLEDGE

designs encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the substation design management principles
- Requirements for the use of the substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types of primary plant designs parameters: note examples include electrical equipment in accordance with the Single Line Diagram, bay spacing, busbar heights, statutory and maintenance clearances in accordance with AS2067 and organisational requirements, switchyard equipment layout, lightning protection, control and power cables routes within and outside switchyard

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the

most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

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Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit is based, shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Completion of two (2) compliant technical designs including each of the following:	<p>Electrical equipment in accordance with the Single Line Diagram.</p> <p>Bay spacing, busbar heights, statutory and maintenance clearances in accordance with AS2067 and organisational requirements.</p> <p>Switchyard equipment layout.</p> <p>Lightning protection.</p> <p>Control and power cables routes within and outside switchyard.</p>
B	Designs should also include all the following:	<p>Activities that address the correction of errors in the process.</p> <p>Application of a design control checklist, which lists all of the required design activities to be carried out in this process.</p>
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual design of transmission, sub-transmission and zone substation primary plant.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design of transmission, sub-transmission and zone substation primary plant and may include the following:

Primary components of a substation which may include: Electrical equipment in accordance with SLD, bays spaced in accordance with standard requirements, switchyard design in accordance with AS2067, equipment spaced so that space is available for maintenance facilities, maintenance space to fence in accordance with AS2067, switchyard equipment device codes correct, busbar earthing facilities available in appropriate positions, earth switches fitted to high busbar, portable earth attachment points in correct position, connections, busbar and flexibles, earthing points, switchgear operating handle positions, disconnecter operator earth mats, anti-vibration Pads and Transformer location, auxiliary transformer location, earth stick storage, control building equipment layout, H.V. cable layout, wiring/connection diagrams, cable schedule, pilot terminations, streamline filter supply, frame leakage CT's, VT 's and CT's, photo electric cells, earthing of plumbing, distribution feeder cable CB connection and route drawing produced by regional designer and checked.

Manufacturer's data sheets, documents, drawings

Manufacturers' recommendations; Reliability performance profiles; Knowledge of local history and experience; Consultation with other Authorities; Environmental influences; Present practices.

Equipment includes; Sectionalisers, air break switches, capacitor banks, transformer taps, metering and protection equipment, data communication systems

Primary and secondary voltage and current injection equipment; time delay measuring equipment; Current transformers; Voltage transformers; Power transformers; Tapchangers; Circuit breakers; Capacitor banks; Ring main units; Audio frequency load control; Circuit breaker auxiliary systems; Substation and metal structure earthing systems; SCADA interfaces and transducer inputs; local opto-isolated alarms; PLC programs; Auto Reclosers (ACRs); protection relays; metering; control circuits; Statistical metering systems; Frame leakage relays; Distance relays; Pilot wire relays; Transformer differential relays; Busbar differential relays; Impedance bus zone relays; Overcurrent and earth fault relays; Transformer neutral check relays; Circuit breaker fail relays; Multi-trip relays; Auto recloser relays; Voltage transformer failure relays; Surge protection relays; Buchholz relays; Winding temperature relays; Sensitive earth fault relays; Phase failure relays; Frequency relays; Load shedding relays; General protection LV devices; Oil temperature protection devices; Oil surge protection devices; Power supplies. differential relays; power systems; multi-faceted schemes; interactive overload schemes, distance protection (incorporating relay selection, switched/non-switched schemes; mutual coupling and teed feeder systems); protection signalling (incorporating series, direct, permissive, distance acceleration, block

RANGE STATEMENT

interruption); telecommunication circuits and equipment.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and / or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
Design

UETTDRDS54A Design power system transmission and sub-transmission protection and control

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the design of transmission, sub-transmission and zone substation protection and control systems. This may include basic secondary upgrades, SCADA modifications or new installations on green field sites. The design must conform to safety regulations and environmental standards and incorporate the principles of safe design.

Application of the Unit

Application of the Unit 2)

This competency standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice

3)

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETTDRDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure
UETTDRDS44A	Design power system substations modifications

Prerequisite Unit(s) 4)

UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus
UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for and coordinate the design of transmission, sub-transmission and zone substation protection and control systems	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of substations, are reviewed and determined.</p> <p>1.2 Purpose of the design is established and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Established policies, procedures and specifications for the design are obtained or established with the appropriate personnel.</p> <p>1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures</p> <p>1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures</p> <p>1.6 Risk control measures are identified, prioritised and evaluated against the work schedule</p> <p>1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures</p> <p>1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated</p>

ELEMENT	PERFORMANCE CRITERIA
	and confirmed in a safe and technical working order
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved and activities coordinated to carry out work
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
2 Carry out and coordinate the design of transmission, sub-transmission and zone substation protection and control systems	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3 System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4 Mathematical models of the design are used to analyse the effectiveness of the finished project as per requirements and established procedures
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure

ELEMENT

PERFORMANCE CRITERIA

		completion of the project within an agreed timeframe according to requirements.
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
3	Complete and coordinate the design of transmission, sub-transmission and zone substation protection and control systems	
	3.1	Final checks of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing transmission, sub-transmission and zone substation protection and control systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS54A Power system transmission and sub-transmission protection and control

Evidence shall show an understanding of designing power system transmission and sub-transmission protection and control to an extent indicated by the following aspects:

T1 Feeder automation system encompassing:

- Function of feeder automation system and the main components
- Operation procedure for a remote field device from a local control station
- Functions of “System Control and Data Acquisition” (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components
- SCADA system security interlocks and access restrictions
- SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciated System and Local Control Station
- Function of the main components of a local/remote control system
- Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciated System and Local Control Station

T2 Commissioning procedures associated with discrete protection and control systems encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures - planning and policy, testing techniques and close out requirements

T3 Design principles of Substation LV AC and DC supply systems encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Wiring conventions, systems and labelling conventions
- Substation equipment identification and layout, wiring and schematic diagrams and other appropriate diagrammatic representations

REQUIRED SKILLS AND KNOWLEDGE

- LV design specifications, supply requirements, electrical load assessments
- Substation LV system distribution requirements including: substation batteries, isolation requirements, paralleling requirements, battery chargers, DC distribution panels and control systems, AC distribution panels and control systems and Auto change-over requirements
- Control equipment and auxiliary relays, flags and alarms
- Common panel layouts

T4 Design principles of Substation control systems encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Wiring conventions, systems and labelling conventions
- Substation equipment identification and layout, wiring and schematic diagrams and other appropriate diagrammatic representations
- Control system design specifications, functions and alarms
- Substation control system requirements which may include:
 - Circuit breaker control - auto reclose, pole discrepancy, anti hunting, spring charge timer over run
 - Transformer control - parallel operations, cooling control, master/slave operation, tap changer control, alarm systems
 - Reactive plant control systems - over voltage/under voltage, under frequency load shed, VAR control

T5 Commissioning procedures associated with distribution protection and control systems encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures - planning, policy and testing techniques
- Close out requirements

T6 Operation and maintenance procedures associated with voltage regulation schemes encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the operating procedures
- Requirements for the use of operating manuals, system diagrams/plans and drawings
- Principles of operation and operating sequences including: voltage control, VAR control, Live Bus/Dead Bus synchronising checks, tap changer principles, requirements for parallel operation, settings and grading
- Techniques associated with: isolation requirements, enterprise maintenance

REQUIRED SKILLS AND KNOWLEDGE

requirements, setting checks, LV injections and electrical measurements

- Ancillary equipment which may include transducers, Buswire schemes, tap position indicators, local/remote control systems, alarm systems
- Voltage regulation scheme types including electro mechanical, micro-processor or combinations of both

T7 Types and applications of test equipment encompassing:

- Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of electrical and/or electronic test equipment
- Types and applications of test equipment used on discrete protection scheme
- Techniques in the use of test equipment - electronic test equipment (Doble and Ohmicrome, gas injection equipment, manufactures test equipment, multimeters, phase angle meters and meggers)

T8 Electrical equipment associated with distribution field device protection and control schemes encompassing:

- Types and applications of electrical equipment - characteristics and capabilities: note examples include the following schemes, automatic circuit reclosers (ACR's), gas switches, secondary injection tests, primary injection tests, TMR Radio's, SCADA, remote control, overcurrent, earth fault, sensitive earth fault, inverse time curves, definite time curves, tripping, reclose, DC supplies, AC supplies and alarms

T9 Circuit breaker auxiliary systems encompassing:

- Types and characteristics of high pressure air systems including air storage and air handling processes
- Types and characteristics of DC systems including battery types, charging systems, protection systems
- Types and characteristics of special ambient gases (SF6) systems including gas conditioning, storage and handling systems
- Types and characteristics of vacuum interrupters
- Types and characteristics of oil filled and oil handling

T10 Detailed operation and setting of discrete protection systems encompassing:

- Earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination, backup protection
- Overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination, backup protection
- Alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, over

REQUIRED SKILLS AND KNOWLEDGE

temperature schemes

T11 Detailed operation of interdependent protection systems encompassing:

- Overcurrent and earth leakage schemes including intertripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic, shading coils
- Pilot wire, phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme, pilot supervisory techniques,
- Load shedding, voltage control, parallel operation, load rejection
- Busbar Protection and CB failure protection
- Reclose system - applications, single shot, multishot, blocking schemes, synchronisation checking

T12 Detailed operation of complex protection systems encompassing:

- Distance - characteristics, electromechanical, electronic, impedance, mho, offset mho, switched schemes, non-switched schemes, blocking schemes, bus zone
- Differential, transformer differential, bus overcurrent - principles, feeder protection, transformer protection, bias systems, harmonic restraint, CT connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, CT connections, special considerations, digital systems
- Types of revenue metering
- Applications of SCADA
- Complex protection systems for communications
- Harmonic control
- Point on wave switching

T13 Detailed operation of fundamental test equipment encompassing:

- Care and safe use
- Operating principles
- Comparison of different operating principle meters used for the same purpose
- Accuracy and loading effects of meters - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence and the use of oscilloscopes

T14 Detailed operation of protection test equipment encompassing:

- Care and safe use
- Operating principles
- Comparison of different operating principle meters used for the same purpose
- Accuracy and loading effects of meters - measurement of timing, voltage, current, resistance, inductance, capacitance, impedance, frequency, phase angle, phase difference and the use of primary, secondary and gas injection equipment

T15 Detailed operation of control equipment test equipment encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Care and safe use
- Operating principles
- Comparing of different control system methods and equipment for the same purpose - circuit breaker, isolators, On Load Tap Changer, pumps, fans, fire systems,

T16 Protection schemes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to protection schemes
- Types of protection schemes encompassing reasons for use, application of protection zones around system elements and degree of protection
- Types of feeder protection equipment - over current protection inverse time-current operating characteristics
- Operation of over current protection equipment used on distribution systems
- Operation of ACRs and their time-current characteristics
- Types and characteristics of over-current relays
- Coordination methods of a distribution feeder protection scheme
- Earth fault protection used on a distribution feeder
- Operation of a single wire earth return (S.W.E.R) system

T17 Principles of transmission, sub-transmission and zone substation control and protection designs encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the substation design management principles
- Requirements for the use of the substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types of drawings to be produced - AC and DC circuit diagrams, panel layouts, connection diagrams, label lists and control cable schedules
- Types of control and protection designs parameters - protection and control systems implemented to suit statutory and organisational requirements, AC and DC circuit diagrams correct and documented
- SCADA hardwired and serially communicated signals, metering, load control, power factor control, AC and DC supplies, protection and control panel layouts and control cable termination diagrams

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 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Completion of two (2) compliant technical designs including each of the following:	<p>Protection and control systems implemented to suit statutory and organisational requirements.</p> <p>AC and DC circuit diagrams correct and documented.</p> <p>SCADA hardwired and serially communicated signals.</p> <p>Metering.</p> <p>Load control.</p> <p>Power factor control.</p> <p>AC and DC supplies.</p> <p>Protection and control panel layouts.</p> <p>Control cable termination diagrams.</p>
B	Designs should also include all the following:	<p>Activities that address the correction of errors in the process.</p> <p>Application of a design control checklist, which lists all of the required design activities to be carried out in this process.</p>
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual design of transmission, sub-transmission and zone substation protection and control systems.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

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Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design of transmission, sub-transmission and zone substation protection and control systems and may include the following:

Manufacturer's recommendations; Reliability performance profiles; Knowledge of local history and experience; Consultation with other Authorities; Environmental influences; Present practices.

Equipment includes; Sectionalisers, air break switches, capacitor banks, transformer taps, metering and protection equipment, data communication systems

Primary and secondary voltage and current injection equipment; time delay measuring equipment; Current transformers; Voltage transformers; Power transformers; Tapchangers; Circuit breakers; Capacitor banks; Ring main units; Audio frequency load control; Circuit breaker auxiliary systems; Substation and metal structure earthing systems; SCADA interfaces and transducer inputs; local opto-isolated alarms; PLC programs; Auto Reclosers (ACRs); protection relays; metering; control circuits; Statistical metering systems; Frame leakage relays; Distance relays; Pilot wire relays; Transformer differential relays; Busbar differential relays; Impedance bus zone relays; Overcurrent and earth fault relays; Transformer neutral check relays; Circuit breaker fail relays; Multi-trip relays; Auto recloser relays; Voltage transformer failure relays; Surge protection relays; Buchholz relays; Winding temperature relays; Sensitive earth fault relays; Phase failure relays; Frequency relays; Load shedding relays; General protection LV devices; Oil temperature protection devices; Oil surge protection devices; Power supplies. differential relays; power systems; multi-faceted schemes; interactive overload schemes, distance protection (incorporating relay selection, switched/non-switched schemes; mutual coupling and teed feeder systems); protection signalling (incorporating series, direct, permissive, distance acceleration, block interruption); telecommunication circuits and equipment.

AC protection circuits: HV FDRs, TFRs, BBP/LBU, LV FDRs

DC protection and control circuits: Supplies and auxiliaries, protection, BBP, trip circuit monitoring, CB monitoring, serially communicated SCADA, control and indication

Hard wire communicated SCADA

TFR tap changer and cooling control circuits

Power factor correction capacitor protection/control

AC Supplies (400/230 V AC)

DC Supplies (125/48 V DC)

Indication lighting timer circuit

RANGE STATEMENT

Miscellaneous circuits may include: Metering, frequency injection, radio/communication, intertripping, frame leakage and SMU control

Connection diagrams may include: Control panels, HV circuit breakers, LV circuit breakers, Line and TFR CT's, TFR neutral CT's, Line VT's, TFR's, disconnectors, battery chargers, fire control panel, power factor and control caps.

Other areas may include: Control panel layouts, control cable schedule and label list.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and / or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.

RANGE STATEMENT

- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design

UETTDRDS55A Design power system transmission and sub-transmission substation earthing

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the design of transmission and sub-transmission zone substation earthing. This may include earth resistivity tests coordination, design of the earth grid, electrodes, grid connections, equipment connections and remote earthing connections to conduct maximum earth fault currents without exceeding the maximum allowable earth potential rise. The design does include earthing engineering aspects and must conform to safety regulations and environmental standards and incorporate the principles of safe design. However, it excludes the certification of earthing design.

Application of the Unit

Application of the Unit 2)

This competency standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice

3)

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETTRDRDS39A	Prepare and manage detailed construction plans for electrical

Prerequisite Unit(s)

4)

power system infrastructure

UETTD RDS44A

Design power system substations modifications

UETTD REL11A

Apply sustainable energy and environmental procedures

UETTD REL16A

Working safely near live electrical apparatus

UETTD RIS62A

Implement and monitor the power system organisational OHS policies, procedures and programs

UETTD RIS63A

Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills

5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|---|--|
| 1 Plan for and coordinate the design of transmission, sub-transmission and zone substation earthing | 1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of substations, are reviewed and determined. |
| | 1.2 Purpose of the design is established and expected outcomes of the work are confirmed with the appropriate personnel. |
| | 1.3 Established policies, procedures and specifications for the design are obtained or established with the appropriate personnel. |
| | 1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures |
| | 1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures |
| | 1.6 Risk control measures are identified, prioritised and evaluated against the work schedule |
| | 1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures |
| | 1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated |

ELEMENT

PERFORMANCE CRITERIA

		and confirmed in a safe and technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
2	Carry out and coordinate the design of transmission, sub-transmission and zone substation earthing	
	2.1	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2	OHS and sustainable energy principles, functionality and practices to avoid incidence and accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the earth grid are used to analyse the effectiveness of the finished project as per requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure

ELEMENT

PERFORMANCE CRITERIA

		completion of the project within an agreed timeframe according to requirements.
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
3	Complete and coordinate the design of transmission, sub-transmission and zone substation earthing	
	3.1	Final checks of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing transmission, sub-transmission and zone substation earthing.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS55A Power system transmission and sub-transmission substation earthing

Evidence shall show an understanding of designing power system transmission and sub-transmission earthing to an extent indicated by the following aspects:

T1 Distribution earthing system encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to the distribution earthing system
- Reason and types of distribution earthing systems
- Terminologies used in the earth systems including, touch and step potential
- Conditions associated when an active HV conductor fails to earth
- Selection of earthing electrodes and grids
- Determination of the earthing resistance of copper clad rods using earthing monograms

T2 Principles of transmission, sub-transmission and zone substation earthing designs encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the substation design management principles
- Requirements for the use of the substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types of activities to be carried out - earth resistivity tests coordination, design of the earth grid, confirmation of control of transfer of EPR
- Types of earthing design parameters - coordination and analysis of earth resistivity tests, design and drafting of earth grid including electrodes, grid connections, equipment connections and remote earthing connections to conduct maximum earth fault currents without exceeding the maximum allowable earth potential rise (EPR), confirmation of acceptable step and touch potentials including attenuation or hazard control measures, water, telephone service and LV neutral supplies isolation to isolate local EPR

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit is based, shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to	Item List

	be demonstrated	
A	Completion of two (2) compliant technical designs including each of the following:	<p>Coordination and analysis of earth resistivity tests.</p> <p>Design and drafting of earth grid including electrodes, grid connections, equipment connections and remote earthing connections to conduct maximum earth fault currents without exceeding the maximum allowable earth potential rise (EPR).</p> <p>Confirmation of acceptable step and touch potentials including attenuation or hazard control measures.</p> <p>Confirmation of control of transfer of EPR.</p>
B	Designs should also include all the following:	<p>Activities that address the correction of errors in the process.</p> <p>Application of a design control checklist which lists all of the required design activities to be carried out in this process.</p>
C	At least one occasion	<p>Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.</p>

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual design of transmission, sub-transmission and zone substation earthing.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design of transmission, sub-transmission and zone substation earthing and may include the following:

Concerns associated with the earthing design should take into account: Grid designed for max fault current, maximum allowable earth potential rise, step potentials, touch potentials, fence separately earthed or bonded to station grid, fence isolation from all items bonded to station grid, e.g. building, grading ring outside fence, two connections to every switchyard device, disconnecter earth mats bonded directly to handle, disconnectors earthed correctly, control building(s) earthed in two places, switchgear building (s) earthed in two places, two connections to switchgear earth bar (s), two connections to control panel earth bar (s), sufficient portable earth connection points, gates earthed via flexible connections, equipotential conductor between all gate posts, grading ring extends to extremity of gate radius, fence earthed adequately, earthing of sheath at substation end of power cables and earthing of sheath at remote end of power cables

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards

RANGE STATEMENT

- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and / or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design.

UETTDRDS56A Design power system transmission, sub-transmission and zone substation civil and structural components

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the design of transmission, sub-transmission and zone substation civil and structural components. This may include augmentations of existing substations or new substations on green field sites. The design includes civil and structural engineering aspects and must conform to safety regulations and environmental standards and incorporate the principles of safe design. However, it excludes the certification of civil and structural design.

Application of the Unit

Application of the Unit 2)

This competency standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice

3)

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETTRDRDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure

Prerequisite Unit(s)

4)

UETTD RDS44A	Design power system substations modifications
UETTD REL11A	Apply sustainable energy and environmental procedures
UETTD REL16A	Working safely near live electrical apparatus
UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills

5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for and coordinate the design of transmission, sub-transmission and zone substation civil and structural components	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of substations, are reviewed and determined.</p> <p>1.2 Purpose of the design is established and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Established policies, procedures and specifications for the design are obtained or established with the appropriate personnel.</p> <p>1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures</p> <p>1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures</p> <p>1.6 Risk control measures are identified, prioritised and evaluated against the work schedule</p> <p>1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures</p> <p>1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working</p>

ELEMENT

PERFORMANCE CRITERIA

order

- | | | | |
|---|---|------|---|
| 2 | Carry out and coordinate the design of transmission, sub-transmission and zone substation civil and structural components | 1.9 | Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved and activities coordinated to carry out work |
| | | 1.10 | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures |
| | | 1.11 | Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures |
| | | 2.1 | Circuit/systems modelling is used to evaluate alternative proposals as per established procedures. |
| | | 2.2 | OHS and sustainable energy principles, functionality and practices to avoid incidence and accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures |
| | | 2.3 | System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures |
| | | 2.4 | Mathematical models of the design are used to analyse the effectiveness of the finished project as per requirements and established procedures |
| | | 2.5 | Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures |
| | | 2.6 | Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed |

ELEMENT

PERFORMANCE CRITERIA

- timeframe according to requirements.
- 2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
- 2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 3 Complete and coordinate the design of transmission, sub-transmission and zone substation civil and structural components
- 3.1 Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
- 3.4 Approved copies of design documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing transmission, sub-transmission and zone substation civil and structural components.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS56A Power system transmission, sub-transmission and zone substation – civil and structural components

Evidence shall show an understanding of designing power system transmission, sub-transmission and zone substation – civil and structural components to an extent indicated by the following aspects:

T1 Principles of transmission, sub-transmission and zone substation civil and structural designs encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the substation design management principles
- Requirements for the use of the substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types of activities to be carried out - earthworks, foundation design including relationship to geotechnical analysis, footing layout including assignment of reference levels and benchmark, conduits, pits and drainage, hydraulics including fire and safety facilities, access roads, fences and gates including implementation of EPR control measures, transformer fire and sound attenuation measures, bunding and oil containment, indoor and outdoor structural steelwork
- Types of civil and structural parameters - access road OK for low loaders and cranes (width, space turning radius, gradient), outdoor steelwork (stands) including strain/landing tower, surge arrester, isolator, voltage transformer, current transformer, circuit breaker, fault thrower, lightening masts, cages/screens, sealing ends, cable supports, operating stands and busbar supports
- Indoor steelwork including frequency injection, cable supports, cages/screens, cable ladder supports

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit is based, shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Completion of two (2) compliant technical designs including each of the following:	<p>Earthworks.</p> <p>Foundation design including relationship to geotechnical analysis.</p> <p>Footing layout including assignment of reference levels and benchmark.</p> <p>Conduits, Pits and drainage.</p> <p>Hydraulics including fire and safety facilities.</p> <p>Access roads.</p> <p>Fences and gates including implementation of EPR control measures.</p> <p>Transformer fire and sound attenuation measures, bunding and oil containment.</p> <p>Indoor and outdoor structural steelwork.</p>
B	Designs should also include all the following:	<p>Activities that address the correction of errors in the process.</p> <p>Application of a design control checklist which lists all of the required design activities to be carried out in this process.</p>
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate

		solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual design of transmission, sub-transmission and zone substation - civil and structural components.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design of transmission, sub-transmission and zone substation civil and structural component and may include the following:

Earthworks, foundations and footings, reference levels (RL)s, conduit and drainage, hydraulics, electrical isolation of water service etc, fire services, access roads, access road OK for low loaders and cranes (width, space turning radius, gradient), fences and gates, single point entry facilities in fences and gates, bundwalls and oil containment, retaining walls, sound attenuation facilities, panel cutouts.

Outdoor steelwork (Stands) may include: Strain/Landing tower, surge arrestor, isolator, voltage transformer, current transformer, circuit breaker, fault thrower, lightning masts, cages/screens, sealing ends, cable supports, operating stands and busbar supports.

Indoor Steelwork may include: Frequency injection, cable supports, cages/screens, cable ladder

Transformer bund facilities.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.
- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention

RANGE STATEMENT

- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and / or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Design

UETTDRDS57A Design power system overhead transmission systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the technical design of overhead transmission networks to relevant standards, including electrical clearances, electrical and mechanical loadings, earthing, environmental considerations, minor civil aspects and the handling of waterway, railway and other crossings. It also includes the necessary established procedures to ensure the line design conforms to specific organisational technical standards, operational and system planning requirements and incorporates the principles of safe design.

Application of the Unit

Application of the Unit 2)

This competency standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice**3)**

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETDRDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure

Prerequisite Unit(s)	4)	
	UETTD RDS45A	Organise and implement ESI line and easement surveys
	UETTD REL11A	Apply sustainable energy and environmental procedures
	UETTD REL16A	Working safely near live electrical apparatus
	UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for and coordinate the design of overhead transmission systems	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of overhead transmission systems, are reviewed and determined.</p> <p>1.2 Purpose of the design is established and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Established policies, procedures and specifications for the design are obtained or established with the appropriate personnel.</p> <p>1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures</p> <p>1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures</p> <p>1.6 Risk control measures are identified, prioritised and evaluated against the work schedule</p> <p>1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures</p> <p>1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working</p>

ELEMENT	PERFORMANCE CRITERIA
	order
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved and activities coordinated to carry out work
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
2 Carry out and coordinate the design of overhead transmission systems	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to avoid incidents and accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3 System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4 Mathematical models of the design are used to analyse the effectiveness of the finished project as per requirements and established procedures
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed

ELEMENT	PERFORMANCE CRITERIA
3 Complete and coordinate the design of overhead transmission systems	<p>timeframe according to requirements.</p> <p>2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements</p> <p>2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.</p> <p>3.1 Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval</p> <p>3.4 Approved copies of design documents are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing overhead transmission systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS57A Power system overhead transmission systems

Evidence shall show an understanding of designing power system transmission systems to an extent indicated by the following aspects:

T1 Generation systems encompassing:

- Methods of generating electricity - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
- Relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
- The purpose and features of typical types of co-generation systems

T2 Transmission structures and hardware encompassing:

- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Types of structures
- Types and function of associated hardware/equipment and insulators
- Types of conductors
- Location of transmissions structures
- Other equipment used on transmission structures, e.g. aircraft warning devices
- Voltages on transmission structures

T3 Procedures for routine maintenance on transmission structures and hardware encompassing:

- Procedures for gaining access permits
- Reasons for gaining access
- Types of maintenance procedures on transmission structures - procedure to follow for inspection/patrols according to the Transmission Supply Authority
- Erecting and removing of transmission equipment and hardware from a tower - climbing procedures, square rigging principles, calculation of forces at work within a given square rigging system and construction of a square rigging system
- Procedures for changing insulators - vertical angle suspension, strain insulator, post insulator (horizontal or vertical) and bridge insulator, calculation of conductor forces
- Installation of temporary work platforms - types and function of installation tools

REQUIRED SKILLS AND KNOWLEDGE

and equipment, precautions and work methods to follow and procedures for installations of temporary work platforms

- Installation of conductor protective hardware - types and selection of common dampers, tools and equipment, control of Aeolian vibration and procedures for the installation of dampers onto conductors
- Dead line insulator washing - supply Authority regulations and procedure for washing de-energised transmission lines

T4 Procedures for installation and maintenance on transmission lines, structures and hardware encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and maintenance of transmission lines and associated equipment
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - minimum construction clearances for transmission lines and sag/tension requirements
- Construction types and structures used in transmission lines
- Types, sizes and characteristics of transmission conductors - aluminium conductors steel reinforced and earthing conductors
- Types of electrical connections used to connect transmission conductors - compression termination and bolted termination
- Causes and effects of poor electrical connections
- Types and application of specialised tools, equipment and hardware for the stringing of transmission conductors
- Techniques for stringing, tensioning and terminating transmission conductors
- Techniques for installation of associated hardware used on transmission towers
- Techniques for maintenance of damaged transmission conductors - repair and replacement

T5 Inspection of towers and structures used for transmission lines encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Characteristics of materials used for towers structures within the electrical transmission system - faults that occur that influence the integrity of the structure
- Deterioration prevention techniques - relationship between steel, and other materials, inspection procedures for deterioration, deterioration prevention procedures in steel and procedures for the repair of deterioration in steel

T6 Inspection of transmission lines encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Clearances and safety procedures
- Ground line inspection procedures of electrical transmission lines - requirements for inspection of transmission lines and insulators, use of specific equipment and testing devices during testing/inspection, techniques in transmission line

REQUIRED SKILLS AND KNOWLEDGE

inspection and methods of recording data

- Overhead line inspection procedures of electrical transmission lines - methods and requirements for overhead line inspection on electrical structures, clearances for overhead conductors, cables and structures, techniques used to obtain close inspection of transmission lines, use of specific equipment and testing devices during testing/inspection and methods of recording data

T7 Plant, equipment and tools used for HV live line work encompassing:

- Commonwealth/State/Territory legislation, Standards, codes, supply authority regulations and or enterprise requirements associated with plant, equipment and tools used for HV live line work
- Safety precautions when working on plant, equipment and tools using hotstick combined - safe working clearances, Occupational Health and Safety hazards and precautions, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment and Authorisation to work systems
- Identification of plant, equipment and tools used for HV live line work - types, applications, construction, characteristics, limitations and Safe working load
- Serviceability of plant, equipment and tools used for HV live line work - inspection procedures, testing procedures, maintenance procedures and storage procedures
- Relationship of live line work access authority/permit, disabling auto-reclose function and ensuring correct functioning of fault current protective devices prior to live line work
- Live line access authorities, disabling auto-reclose function and ensuring fault current protective devices prior to live line work
- Conductor supports encompassing: methods, types of equipment, construction, characteristics and limitations
- Techniques in selecting appropriate conductor support method in accordance with requirements
- Calculation of loads and wind loading on conductors
- Effects of resultant forces when transferring conductor loads
- Rigging procedures for conductor support equipment

T8 High voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment and network interconnectors source of possible backfeed
- Role of the HV switching operator
- Operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits and the purpose and

REQUIRED SKILLS AND KNOWLEDGE

procedure for operational forms, access authorities and permits

- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stragglers
- Types and categories of HV switchgear
- Application, function and operating capabilities of switchgear
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV transmission main and working earths
- Earthing HV electrical apparatus practices and procedures for access - purposes of “Operational” and additional work part “on-site” earths, factors determining the location and effectiveness of “Operational” earthing, acceptable industry procedures and personal protective equipment
- High voltage switching techniques
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

T9 Feeder automation system encompassing:

- Function of feeder automation system and the main components
- Operation procedure for a remote field device from a local control station
- Functions of “System Control and Date Acquisition” (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components
- SCADA system security interlocks and access restrictions
- SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciated System and Local Control Station
- Function of the main components of a local/remote control system
- Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciated System and Local Control Station

T10 HV overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to HV overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment
- Role and responsibilities of the HV switching operator
- Operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments and the purpose and procedure for operational forms, access authorities and hazard/risk assessments
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stragglers
- HV switchgear encompassing: types, categories, application and operating capabilities

REQUIRED SKILLS AND KNOWLEDGE

- Operation of HV overhead switching or indicating devices - fuses; disconnect fuses; load switching; live line indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing sticks; phasing tester
- Operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing;
- HV switching techniques;
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

T11 AC transmission system components encompassing:

- Support structures and reasons for selection
- Insulators and reasons for selection
- Conductors and reasons for selection
- Vibration management systems and principles
- Line ratings based on voltage, span, tension and temperature

T12 AC transmission line electrical parameters encompassing:

- Typical arrangements
- Parameters of significance
- Calculation of line parameters - calculation of resistive, inductive and capacitive values assuming regular transposition and solid conductors
- Comparison with actual values
- Typical parameter values and ratios for different voltage level lines.

T13 AC transmission line models encompassing:

- Types of transmission line models based on line length
- Calculation of voltage drop, line regulation, and transmission efficiency
- Load sharing between lines.

T14 Basic design features and characteristics of transmission structures and associated equipment and or components encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing of poles/structures and associated equipment and or components
- Transmission systems principles - terminologies, primary and secondary, voltage levels and types of lines
- Characteristics of structure - types of structure (towers and poles, concrete and steel), characteristics of types of structures, installation methods and maintenance

REQUIRED SKILLS AND KNOWLEDGE

techniques

- Characteristics of associated equipment used on structures - insulators and earthing including overhead earth and communication lines

T15 Voltage control techniques encompassing:

- Conditions leading to voltage collapse
- Effects on system of high and low voltage
- Voltage control devices - voltage regulators applied to generators and synchronous phase modifiers, electromagnetic voltage regulators, series and parallel capacitors, OLTC transformers and static VAR compensators (SVC's). SVC's includes saturated reactor compensators; thyristor controlled reactor compensators and combined systems
- Production of harmonics and methods of harmonic control
- Location of voltage control devices within the system

T16 Corona encompassing:

- Factors leading to the generation of corona - voltage levels, conductor spacings, conductor sizes and shaping, atmospheric conditions
- Consequences of corona
- Corona reduction - conductor selection, conductor bundling, conductor surface treatment, grading rings
- Internal discharge - causes of internal discharge, effects of internal discharge, testing techniques

T17 Effects of harmonics encompassing:

- Characteristics and effects of harmonics on protection device functions/malfunction
- Effects of harmonics on the following: transformers, generators, motors and quality of supply

T18 HV system load calculation principles encompassing:

- Structure of HV systems
- Ratings of HV system components
- Relationship to HV customers
- Methods of determining load on HV systems
- Records of load on HV systems
- Effect of added load on HV feeders: note examples include variation of current, voltage, power, reactive power and power factor
- Load flows in parallel or loop operation
- Enterprise specific network coordination tools

T19 EHV system load calculation principles encompassing:

- Structure of EHV transmission systems
- Ratings of EHV system components

REQUIRED SKILLS AND KNOWLEDGE

- Relationship to EHV customers
- Relationship to generation sources
- Methods of determining load on EHV systems
- Records of load on EHV systems
- Effect of added load on EHV transmission systems - variation of current, voltage, power, reactive power and power factor
- Load flows in parallel or loop operation
- Enterprise specific network coordination tools

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit is based, shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills;

and

- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Completion of six (6) compliant technical designs of an overhead transmission system with at least one relating to each of the following project types:	Multi-tower extensions New installations Multi-circuit overhead lines
B	Designs should also include all the following:	Activities that address the correction of errors in the process. Application of a design control checklist which lists all of the required design activities to be carried out in this process.
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual design of overhead transmission systems.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design of overhead transmission systems and may include the following items or equipment:

Manufacture's data sheets, documents, drawings

Manufacturers' recommendations; Reliability performance profiles; Knowledge of local history and experience; Consultation with other Authorities; Environmental influences; Present practices.

Equipment includes; Sectionalisers, air break switches, capacitor banks, transformer taps, metering and protection equipment, data communication systems

Primary and secondary voltage and current injection equipment; time delay measuring equipment; Current transformers; Voltage transformers; Power transformers; Tapchangers; Circuit breakers; Capacitor banks; Ring main units; Audio frequency load control; Circuit breaker auxiliary systems; Substation and metal structure earthing systems; SCADA interfaces and transducer inputs; local opto-isolated alarms; PLC programs; Auto Reclosers (ACRs); protection relays; metering; control circuits; Statistical metering systems; Frame leakage relays; Distance relays; Pilot wire relays; Transformer differential relays; Busbar differential relays; Impedance bus zone relays; Overcurrent and earth fault relays; Transformer neutral check relays; Circuit breaker fail relays; Multi-trip relays; Auto recloser relays; Voltage transformer failure relays; Surge protection relays; Buchholz relays; Winding temperature relays; Sensitive earth fault relays; Phase failure relays; Frequency relays; Load shedding relays; General protection LV devices; Oil temperature protection devices; Oil surge protection devices; Power supplies. differential relays; power systems; multi-faceted schemes; interactive overload schemes, distance protection (incorporating relay selection, switched/non-switched schemes; mutual coupling and teed feeder systems); protection signalling (incorporating series, direct, permissive, distance acceleration, block interruption); telecommunication circuits and equipment.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.

RANGE STATEMENT

- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and / or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
Design

UETTDRDS58A Design underground transmission systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the technical design of underground transmission networks to relevant standards, including cable sizing and locations, soil resistivity and heat dissipation, backfill and trenching details, minor civil aspects and dynamic and cyclic ratings. It also includes the necessary established procedures to ensure the line design conforms to specific organisational technical standards, operational and system planning requirements and incorporates the principles of safe design.

Application of the Unit

Application of the Unit 2)

This competency standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice**3)**

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UETDRDS39A	Prepare and manage detailed construction plans for electrical power system infrastructure
UETDRDS45A	Organise and implement ESI line

Prerequisite Unit(s)	4)	and easement surveys
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for and coordinate the design of underground transmission systems	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of underground transmission systems, are reviewed and determined.</p> <p>1.2 Purpose of the design is established and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Established policies, procedures and specifications for the design are obtained or established with the appropriate personnel.</p> <p>1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures</p> <p>1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures</p> <p>1.6 Risk control measures are identified, prioritised and evaluated against the work schedule</p> <p>1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures</p> <p>1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working</p>

ELEMENT	PERFORMANCE CRITERIA
	order
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land-owners are resolved and activities coordinated to carry out work
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
2 Carry out and coordinate the design of underground transmission systems	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to avoid incidents and accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3 System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4 Mathematical models of the design are used to analyse the effectiveness of the finished project as per requirements and established procedures
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed

ELEMENT	PERFORMANCE CRITERIA
3 Complete and coordinate the design of underground transmission systems	<p>timeframe according to requirements.</p> <p>2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements</p> <p>2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.</p> <p>3.1 Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval</p> <p>3.4 Approved copies of design documents are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing underground transmission systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TDS58A Underground transmission systems

Evidence shall show an understanding of designing underground transmission systems to an extent indicated by the following aspects:

T1 Generation systems encompassing:

- Methods of generating electricity - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
- Relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
- The purpose and features of typical types of co-generation systems

T2 Transmission structures and hardware encompassing:

- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Types of structures
- Types and function of associated hardware/equipment and insulators
- Types of conductors
- Location of transmissions structures
- Other equipment used on transmission structures, e.g. aircraft warning devices
- Voltages on transmission structures

T3 Procedures for routine maintenance on transmission structures and hardware encompassing:

- Procedures for gaining access permits
- Reasons for gaining access
- Types of maintenance procedures on transmission structures - procedure to follow for inspection/patrols according to the Transmission Supply Authority
- Erecting and removing of transmission equipment and hardware from a tower - climbing procedures, square rigging principles, calculation of forces at work within a given square rigging system and construction of a square rigging system
- Procedures for changing insulators - vertical angle suspension, strain insulator, post insulator (horizontal or vertical) and bridge insulator, calculation of conductor forces
- Installation of temporary work platforms - types and function of installation tools

REQUIRED SKILLS AND KNOWLEDGE

and equipment, precautions and work methods to follow and procedures for installations of temporary work platforms

- Installation of conductor protective hardware - types and selection of common dampers, tools and equipment, control of Aeolian vibration and procedures for the installation of dampers onto conductors
- Dead line insulator washing - supply Authority regulations and procedure for washing de-energised transmission lines

T4 Procedures for installation and maintenance on transmission lines, structures and hardware encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and maintenance of transmission lines and associated equipment
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - minimum construction clearances for transmission lines and sag/tension requirements
- Construction types and structures used in transmission lines
- Types, sizes and characteristics of transmission conductors - aluminium conductors steel reinforced and earthing conductors
- Types, sizes and characteristics of transmission conductors - aluminium conductors steel reinforced and earthing conductors
- Types of electrical connections used to connect transmission conductors - compression termination and bolted termination
- Causes and effects of poor electrical connections
- Types and application of specialised tools, equipment and hardware for the stringing of transmission conductors
- Techniques for stringing, tensioning and terminating transmission conductors
- Techniques for installation of associated hardware used on transmission towers
- Techniques for maintenance of damaged transmission conductors - repair and replacement

T5 High voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment and network interconnectors source of possible backfeed
- Role of the HV switching operator
- Operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits and the purpose and procedure for operational forms, access authorities and permits
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers

REQUIRED SKILLS AND KNOWLEDGE

- Types and categories of HV switchgear
- Application, function and operating capabilities of switchgear
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV transmission main and working earths
- Earthing HV electrical apparatus practices and procedures for access - purposes of “Operational” and additional work part “on-site” earths, factors determining the location and effectiveness of “Operational” earthing, acceptable industry procedures and personal protective equipment
- High voltage switching techniques
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

T6 Feeder automation system encompassing:

- Function of feeder automation system and the main components
- Operation procedure for a remote field device from a local control station
- Functions of “System Control and Data Acquisition” (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components
- SCADA system security interlocks and access restrictions
- SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciated System and Local Control Station
- Function of the main components of a local/remote control system
- Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciated System and Local Control Station

T7 Layout principles for underground mains distribution extension encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to underground mains distribution extension
- Requirements for the use of underground mains construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Methods in determining material, equipment and tool lists - components types and quantity required, spacing of components and equipment, costings of items and components.
- Purchasing and contractual arrangements to include a requirement to eliminate OHS hazards, minimise risks and provide residual OHS risk information
- Determination of conductor size, type and route length
- Resources needed for the laying of conductors
- Determining the appropriate excavation for the location
- Determining the size and depth of excavation
- Determining the trench and pit layout procedures

REQUIRED SKILLS AND KNOWLEDGE

- Minimum clearances between conductors
- Estimation of the duration of underground distribution extension project

T8 Effects of harmonics to an extent indicated by the following aspects:

- Characteristics and effects of harmonics on protection device functions/malfunction
- Effects of harmonics on the following: transformers, generators, motors and quality of supply

T9 HV system load calculation principles encompassing:

- Structure of HV systems
- Ratings of HV system components
- Relationship to HV customers
- Methods of determining load on HV systems
- Records of load on HV systems
- Effect of added load on HV feeders - variation of current, voltage, power, reactive power and power factor
- Load flows in parallel or loop operation
- Enterprise specific network coordination tools

T10 EHV system load calculation principles encompassing:

- Structure of EHV transmission systems
- Ratings of EHV system components
- Relationship to EHV customers
- Relationship to generation sources
- Methods of determining load on EHV systems
- Records of load on EHV systems
- Effect of added load on EHV transmission systems - variation of current, voltage, power, reactive power and power factor
- Load flows in parallel or loop operation
- Enterprise specific network coordination tools

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit is based, shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Completion of six (6) compliant technical designs of an underground transmission network with at least one relating to each of the following project types:	Alteration to existing assets Underground supplies between substations possibly including overhead to underground connections.
B	Designs should also include all the following:	Activities that address the correction of errors in the process. Application of a design control checklist which lists all of the required design activities to be carried out in this process.
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual design of underground transmission systems.

In addition to the resources listed above, in Context of and specific

resources for assessment, evidence should show demonstrated competency working realistic environment and a variety of conditions.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design of underground transmission systems and may include the following items or equipment:

Manufacture's data sheets, documents, drawings

Manufacturers' recommendations; Reliability performance profiles; Knowledge of local history and experience; Consultation with other Authorities; Environmental influences; Present practices.

Equipment includes; Sectionalisers, air break switches, capacitor banks, transformer taps, metering and protection equipment, data communication systems

Primary and secondary voltage and current injection equipment; time delay measuring equipment; Current transformers; Voltage transformers; Power transformers; Tapchangers; Circuit breakers; Capacitor banks; Ring main units; Audio frequency load control; Circuit breaker auxiliary systems; Substation and metal structure earthing systems; SCADA interfaces and transducer inputs; local opto-isolated alarms; PLC programs; Auto Reclosers (ACRs); protection relays; metering; control circuits; Statistical metering systems; Frame leakage relays; Distance relays; Pilot wire relays; Transformer differential relays; Busbar differential relays; Impedance bus zone relays; Overcurrent and earth fault relays; Transformer neutral check relays; Circuit breaker fail relays; Multi-trip relays; Auto recloser relays; Voltage transformer failure relays; Surge protection relays; Buchholz relays; Winding temperature relays; Sensitive earth fault relays; Phase failure relays; Frequency relays; Load shedding relays; General protection LV devices; Oil temperature protection devices; Oil surge protection devices; Power supplies. differential relays; power systems; multi-faceted schemes; interactive overload schemes, distance protection (incorporating relay selection, switched/non-switched schemes; mutual coupling and teed feeder systems); protection signalling (incorporating series, direct, permissive, distance acceleration, block interruption); telecommunication circuits and equipment.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration.

RANGE STATEMENT

- Documenting detail work events, record keeping and or storage of information.
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures.
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and / or permits to work
- Personnel.
- Quality assurance systems.
- Requirements.
- Safe design principles
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
Design

UETTDREL11A Apply sustainable energy and environmental procedures

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the implementation of relevant environmental procedures to specific projects/sites. It includes the identification of possible environmental risks and impacts, the undertaking of work in accordance with sustainable energy and energy conservation principles, the provision of re-cycling materials and the recording and reporting of environmental incidents. It also encompasses the process of reviewing and participating and contributing in environmental procedures according to established enterprise requirements.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice**3)**

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

There are no prerequisite competencies to this unit.

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading	3	Writing	3	Numeracy	3
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Employability Skills Information**Employability Skills****5)**

The required outcomes described in this unit of

Employability Skills

5)

competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Prepare to implement environmental and sustainable energy procedures	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.3	OHS policies and procedures related to requirements and established procedures for the implementation of environmental and sustainable energy procedures are obtained and confirmed for the purposes of the work to be performed and communicated.
		1.4	Environmental and sustainable energy procedures are identified, prioritised and combined within relevant projects, following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
		1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept

ELEMENT**PERFORMANCE CRITERIA**

clear according to established procedures.

- | | |
|------|--|
| 1.6 | Relevant work permits are obtained to access and perform work according to environmental and sustainable energy procedures, requirements and/or established procedures. |
| 1.7 | Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order. |
| 1.8 | Relevant personnel at worksite are confirmed current in environmental and sustainable energy procedures and other related work procedures according to requirements. |
| 1.9 | Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary. |
| 1.10 | Site is prepared according to the work schedule, taking into account environmental and sustainable energy procedures and the need to minimise risk and damage to property, commerce, and individuals in accordance with established procedures. |
| 1.11 | Personnel participating in the work, including plant operators and contractors, are fully briefed on environmental and sustainable energy procedures and respective responsibilities confirmed where applicable in accordance with established procedures. |
| 2 | Carry out environmental and sustainable energy procedures |
| 2.1 | OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures. |
| 2.2 | Use of power tools/equipment, techniques and practices are safely followed under environmental and sustainable energy procedures and, currency according to requirements confirmed. |

ELEMENT	PERFORMANCE CRITERIA
2.3	Essential knowledge and associated skills are applied in the safe implementation of environmental and sustainable energy procedures to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
2.4	Relevant environmental procedures are applied to a specific project(s)/site(s).
2.5	Work is conducted in accordance with the principles of sustainable energy and energy conservation.
2.6	Provision for the re-cycling or re-use of materials is undertaken where possible.
2.7	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
2.8	Unplanned events in the implementation of environmental and sustainable energy procedures are undertaken within the scope of established procedures.
2.9	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills on environmental and sustainable energy procedures.
2.10	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the environmental and sustainable energy procedures	<p>3.1 Work undertaken is checked against works schedule for conformance with requirements and environmental and sustainable energy procedures and, anomalies reported in accordance with established procedures.</p> <p>3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.</p> <p>3.3 Work site is rehabilitated, cleaned up and made</p>

ELEMENT**PERFORMANCE CRITERIA**

- safe in accordance with environmental and sustainable energy procedures as well as other established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with environmental and sustainable energy procedures as well as other established procedures.
- 3.5 Relevant work permit(s) are signed off and, environmental risks/incidents and potential impacts are reported and recorded according to requirements/established procedures.
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of applying environmental and sustainable energy procedures.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TEL11A Environmental fundamentals

Evidence shall show an understanding of environmental fundamentals to an extent indicated by the following aspects:

T1 Environmental standards, codes, environmental legislation, supply authority regulations and or enterprise requirements applicable to the control of environment associated with the worksite encompassing:

- Relevant federal legislation
- Relevant state/territory legislation
- Relevant local government by-laws
- Relevant government or quasi government policies and regulations
- Relevant community planning and development agreements - land care agreements

T2 Employer and employee responsibilities

T3 Methods of obtaining information on environmental issues and updates

T4 Methods of identifying environmental impacts from work related activities

T5 Meaning of environmental terms encompassing:

- Identification, assessment and control of risks
- Compliance
- Best practice
- Sustainable energy

T6 Procedures in implementing management plans to ensure compliance

KS02-TEL11A Material handling and the environment

Evidence shall show an understanding of material handling and the environment to an extent indicated by the following aspects:

T1 Methods of obtaining updated environmental information and data sheets on the proper use and handling of equipment and materials

T2 Environmental standards, codes, environmental legislation, OHS legislation, hazardous substances/dangerous goods regulations, supply authority regulations and or enterprise requirements applicable environmental care when handling materials including provision of manufacturers and suppliers information such as material safety

REQUIRED SKILLS AND KNOWLEDGE

data sheets (MSDS)

T3 Types and application of personal protective equipment used for hazards substances and dangerous goods

T4 Techniques in handling equipment to eliminate/reduce risks to the environment from spillages of oils, herbicides, pesticides and chemicals from such equipment encompassing:

- Vehicle loading crane
- Chainsaw
- Enterprise vehicles
- Explosive power tools

T5 Procedures for handling and control of spillages of herbicides

T6 Methods of disposing and storage of herbicides, pesticides, oils and chemicals

T7 Methods of cleaning mobile plant, equipment and tools

T8 Emergency procedures for spillages of oil to reduce risks to the environment encompassing:

- Methods of cleaning up excessive spillages
- Methods of protection to surrounding environment
- Procedure for notification of relevant personnel and authorities
- Recording procedures

T9 Recording of data

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that

can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated

within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Environmental risk assessment Legislative requirements Sustainable energy principles and practice
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic

		assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual environmental and sustainable energy procedures.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace

UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus

UETTDREL14A Working safe near live electrical apparatus as a non-electrical worker

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Unit shall be demonstrated in relation to the application of relevant environmental and sustainable energy procedures to specific projects/sites incorporating energy conservation principles and relevant re-cycling procedures.

Specific project(s)/site(s) may include, but is not limited to buildings; plants construction and maintenance sites; workshops; laboratories; catchments; flood plains irrigation sites; wetlands; drainage sites; waste disposal sites; easements.

Environmental risks may include impact of mismanagement of chemicals; impact of mismanagement of biological agents; detrimental impact on limited water resources; spillage; waste disposal; detrimental impact on water catchment areas (urban and non-urban); detrimental impact on rivers, waterways and channels; unsatisfactory trade waste treatment and disposal processes; poor construction processes; planning deficiencies; neglect of sustainable energy principles

Environmental legislation may include relevant federal legislation; relevant State/Territory legislation; relevant local government by-laws; relevant government or quasi government policies and regulations; relevant community planning and development agreements (e.g. land care agreements)

Incidents of environmental impact may include emissions to air; releases to/of water; releases to land; vibration and noise; disposal of waste; contamination of land; impact on communities; destruction of habitat; use of energy sources; waste generation processes and technologies; impact on culturally significant sites; and may involve the implementation of emergency responses

Environmental management documentation may include information on applicable environmental laws or other requirements; complaint records; training records; process information; process operational log books; inspection, maintenance and calibration records; relevant contractor and supplier information; incident reports; information on emergency preparedness and response; records of significant environmental impacts; chain of custody and compliance records; audit results; management reviews

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration

RANGE STATEMENT

- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Entry Level – Cross Discipline Units.

UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the safe operation of plant and equipment near live electrical conductors and/or apparatus. It encompasses plant and equipment relevant to the enterprise and is in addition to any Commonwealth, State/Territory or Local Government legislation and or regulatory requirements regarding the operation of that plant and or equipment. It includes maintenance the conducting of operational checks, the correct positioning of road signs, barriers and or warning devices. It also encompasses the completion of log books and job completion documentation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice

3)

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UETTDREL16A	Working safely near live electrical apparatus

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in

Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|--|--|
| 1 Prepare to operate plant and equipment near energised and exposed electrical conductors/apparatus | 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection. |
| | 1.2 Relevant requirements and established procedures for the operation of plant and equipment near energised and exposed electrical conductors/apparatus are communicated to all personnel and identified for all work sites. |
| | 1.3 OHS policies and procedures related to requirements and established procedures for the operation of plant and equipment near energised |

ELEMENT

PERFORMANCE CRITERIA

- and exposed electrical conductors/apparatus are obtained and confirmed for the purposes of the work to be performed and communicated.
- 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
 - 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
 - 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
 - 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
 - 1.8 Relevant personnel at worksite are confirmed current in First Aid, relevant rescue procedures and other related work procedures according to requirements.
 - 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
 - 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
 - 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
 - 1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the operation of plant and equipment near energised and exposed electrical conductors/apparatus	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Essential knowledge and associated skills are applied in the safe operation of plant and equipment near energised and exposed electrical conductors/apparatus to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.4 Plant and equipment are safely operated near energised and exposed electrical conductors/apparatus according to requirements and established procedures.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6 Unplanned events in the operation of plant and equipment near energised and exposed electrical conductors/apparatus are undertaken within the scope of established procedures.
	2.7 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.8 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the operation of plant and equipment near energised and exposed electrical conductors/apparatus	<p>3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.</p> <p>3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.</p> <p>3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.</p> <p>3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.5 Relevant work permit(s) are signed off and, plant and equipment are checked, returned to service/stored appropriately, in accordance with requirements and established procedures.</p> <p>3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of operating plant and equipment near live electrical conductors/apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TEL12A Chain saw principles

Evidence shall show an understanding of requirements for the use of chain saws including relevant certification and licensing (if required) to an extent indicated by the following aspects:

T1 Safety precautions, requirements and responsibilities

T2 Selection and use of appropriate personal protective equipment

T3 Chain saw operation encompassing:

- Parts and function of components and ancillary equipment
- Pre-operational checks
- Starting procedures
- Safe use of chain saw under load
- Safe transporting and storage procedures

KS02-TEL12A Elevating work platform operational principles

Evidence shall show an understanding of operation of elevating work platform (EWP) to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with EWP including relevant certification and licensing encompassing:

- Safe working clearances
- Safe operation procedures and the mandatory wearing of harness/attachment requirements
- Safety observers
- Inspection and testing procedures prior to use
- Set-up, operate and shut down procedures for an EWP

T2 Emergency procedures for an EWP encompassing:

- Escape procedures for an EWP
- Rescuing procedures
- Mechanical failure procedures

T3 Types of EWPs insulated/uninsulated

REQUIRED SKILLS AND KNOWLEDGE

KS03-TEL12A Enterprise vehicles

Evidence shall show an understanding of requirements for the use of enterprise vehicles such as, trucks and four wheel drives to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with safe use of enterprise vehicles including relevant certification and licensing such as encompassing:

- Motor cars
- Light and heavy commercial trucks
- Heavy truck/trailer combination
- Four wheel drive vehicles

T2 Compliance with regulations associated with the securing of loads prior for transportation

KS04-TEL12A Hydraulic and pneumatic portable equipment

Evidence shall show an understanding of operation and maintenance of mobile plant, tools and equipment to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with portable hydraulic equipment and portable pneumatic equipment, including relevant certification and licensing encompassing:

- Safe working clearances
- Safe operation procedures
- Safety observers

T2 Inspection and testing procedures prior to use

T3 Set-up, operate and shut down procedures

T4 Permit to work systems and isolation procedures

KS05-TEL12A Basic rigging techniques

Evidence shall show an understanding of basic rigging techniques to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with rigging including the operation of cranes, hoists and winches and relevant certification and licensing (if required)

T2 Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings

T3 Safe use of rigging equipment, tools and associated equipment encompassing:

- Types, techniques and application
- Site inspection procedures encompassing:
- Identifying hazards, assessing and controlling risks
- Appropriate sequence of loading and unloading

REQUIRED SKILLS AND KNOWLEDGE

T4 Determining the mass and dimensions of load

T5 Selection and inspection procedures encompassing:

- Rigging equipment, materials and tools
- Note: Examples include natural and synthetic fibre ropes and chains, fittings, winch and capstan
- Ratings of wire ropes and slings
- Removing, repairing and replacing of damage parts

T6 Techniques for assembling and erecting power winches and capstans

T7 Checking the integrity of support structure; visual inspection of load connections

T8 Techniques in moving, lifting, shifting, managing and placing loads encompassing:

- Use of appropriate communication and signalling methods
- Codes of practice/compliance
- Enterprise and Commonwealth, State/Territory legislative requirements
- Weather conditions
- Erection of safety nets and lines
- Methods of fixing and anchoring loads
- Load stability

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this

shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least four of the following:	Portable generators Chain-saws Concrete cutters Jack hammers Welders Compressor Crimper-cutters Pumps Post hole diggers Drills Friction grip winches Pullers

		Block and tackle
B	At least one of the following:	Elevating work platform Back hoes Self loading vehicle Borer Bobcat Trench excavators Heavy vehicles
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items. Note Refer to Section 2.1 Licence to practice contained in this unit for information relevant to the use of the above equipment.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual operation of plant and equipment near live conductors and or apparatus.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated

competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDREL1 3A Comply with sustainability, environmental and incidental response policies and procedures

UEENEEE10 1A Apply Occupational Health Safety regulations, codes and practices in the workplace

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the operation of plant and equipment near live electrical conductors and/or apparatus.

Support plant may include elevating work platform, back hoes, earth drilling rigs, trench excavators, heavy vehicles, concrete cutters, compressors, portable generators, welders, crimper-cutters, pumps, chain-saws, jack-hammers, post hole diggers, sand-blasters, drills and self loading vehicle.

Equipment may include hand operated ratchet and friction grip winches, chain pullers and block and tackle.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Entry Level –Cross Discipline Units.

UETTDREL13A Comply with sustainability, environmental and incidental response policies and procedures

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the compliance of environmental and incidental response procedures whilst undertaking tasks in the Electricity Supply Industry workplace and refers to relevant legislation, codes and practices and established procedures. The competency standard refers to compliance with relevant sections of Federal and State OHS and Environmental Protection Acts. The checking of plant and equipment should be performed through visual and mechanical checks. The plant and equipment used is that typically used in preparing worksites and compliance with environmental policies and procedures. Relevant regulations and procedures are referred to, but not limited to, the worksite and the use of plant; machinery/equipment; cleaning materials and aids; equipment operation; personal protective equipment e.g. safety boots, eye and ear protection, safety helmets.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

There are no prerequisite competencies to this unit.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to comply with environmental and incident response procedures	1.1	Work instructions are received and confirmed.
	1.2	Relevant requirements and established procedures to be followed for the work to be performed are discussed with all persons to establish and confirm the work schedule.
	1.3	OHS and environmental policies and procedures to be followed for the work to be performed are received and confirmed.
	1.4	Suggestions to assist with complying with environmental and incident response procedures are made to others involved in the work.
	1.5	Hazards are identified, OHS risks assessed and emergency exits kept clear according to given instructions and established procedures.
	1.6	Scope of responsibility under any relevant work permits are received and confirmed according to requirements and established procedures with

ELEMENT

PERFORMANCE CRITERIA

relevant persons.

- | | | | |
|---|--|--|---|
| | 1.7 | Resources including environmental compliance personal protective equipment required for the incident are obtained and in working order according to established procedures. | |
| | 1.8 | Relevant responsibilities associated with first aid and other related work safety procedures at the worksite are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident. | |
| | 1.9 | Client issues are referred to appropriate persons in accordance with industry and community standards. | |
| | 1.10 | Site is reviewed according to given instructions and the work schedule for a quality outcome and to minimise risk and damage to property, commerce and individuals in accordance with established procedures. | |
| | 1.11 | Road signs, barriers and warning devices are positioned in accordance with requirements. | |
| 2 | Carry out compliance with environmental and incident response procedures | 2.1 | OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures. |
| | | 2.2 | Environmental requirements for the work are mentioned, reviewed and control measures, recommended for inclusion in the work process. |
| | | 2.3 | Any environmental incidents and potential problems are referred to appropriate persons in accordance with established procedures. |
| | | 2.4 | Lifting, climbing, working in confined spaces and or aloft, and use of power tools, techniques and practices are safely followed in accordance with given instructions and according to |

ELEMENT

PERFORMANCE CRITERIA

- requirements confirmed to eliminate the prospects of incidents.
- 2.5 Operational knowledge for compliance with environmental and incident response procedures is confirmed to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements and established procedures.
- 2.6 Complying with environmental and incident response procedures is carried out in accordance with given instructions and established procedures.
- 2.7 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.8 Non-routine events are referred to the immediate authorised persons for directions according to established procedures.
- 2.9 Problems associated with complying with environmental and incident response procedures are dealt with using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met.
- 2.10 Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures.
- 3 Complete the compliance with environmental and incident response procedures
- 3.1 Work undertaken is checked against work schedule and anomalies reported to authorised persons in accordance with established procedures.
- 3.2 Accidents and incidents are reported to authorised persons in accordance with established procedures.
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with given instructions and established procedures.

ELEMENT

PERFORMANCE CRITERIA

- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Appropriate persons are notified of work completion according to established procedures.
- 3.6 Environmental completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of complying with environmental and incidental response procedures.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TEL13A ESI incidental response policies and procedures

Evidence shall show an understanding of distribution overhead installations testing and verification to an extent indicated by the following aspects:

T1 Electrical safe working practices encompassing:

- Risk management and assessment of risk - principle and purpose of risk management, processes for conducting a risk assessment
- Hazards associated with low-voltage, extra-low voltage and high-currents - arrangement of power distribution and circuits in an electrical installations, parts of an electrical system and equipment that operate at low-voltage and extra-low voltage, parts of an electrical system and equipment where high-currents are likely.
- Risks and control measures associated with high-voltage - parts of an electrical system and equipment that operate at high-voltage, the terms 'touch voltage', 'step voltage', 'induced voltage' and 'creepage' as they relate to the hazards of high-voltage, control measures used for dealing with the hazards of high-voltage
- Optical fibre safety - coherent optical sources and joining procedures, laser safety class 3a devices or their replacement
- Risks and control measures associated with low voltage - risks associated with modifying electrical installations, fault finding, maintenance and repair, control measures before, while and after working on electrical installations, circuits or equipment, isolation and tagging-off procedures, risks and restrictions in working live, control measures for working live
- Risks and control measures associated with harmful dusts and airborne contaminants - thermal insulation, fibrous cement materials and asbestos and other fibre reinforced switchboard materials.
- Safety, selection, use, maintenance and care of test equipment - safety characteristics of electrical testing devices, safe use of electrical testing device, checks and storage methods for maintaining the safety of testing devices

T2 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on

REQUIRED SKILLS AND KNOWLEDGE

different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors

- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker's body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair
- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work

T3 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T4 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where

REQUIRED SKILLS AND KNOWLEDGE

and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures

- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

KS02-TEL13A Energy sector sustainability and environmental policies and procedures

Evidence shall show an understanding of energy sector sustainability and environmental policies and procedures to an extent indicated by the following aspects:

T1 Environmental fundamentals encompassing:

- Environmental standards, codes, environmental legislation, supply authority regulations and or enterprise requirements applicable to the control of environment associated with the worksite - relevant federal legislation, relevant state/territory legislation, relevant local government by-laws, relevant government or quasi government policies and regulations, relevant community planning and development agreements (include land care agreements)
- Employer and employee responsibilities
- Methods of obtaining information on environmental issues and updates
- Methods of identifying environmental impacts from work related activities
- Meaning of environmental terms - identification, assessment and control of risks, compliance, best practice, sustainable energy.
- Procedures in implementing management plans to ensure compliance

T2 Material handling and the environment encompassing:

- Methods of obtaining updated environmental information and data sheets on the proper use and handling of equipment and materials
- Environmental standards, codes, environmental legislation, OHS legislation, hazardous substances/dangerous goods regulations, supply authority regulations and or enterprise requirements applicable environmental care when handling materials including provision of manufacturers and suppliers information such as material safety data sheets (MSDS)
- Types and application of personal protective equipment used for hazards substances
- Types and application of personal protective equipment used for hazards substances and dangerous goods
- Techniques in handling equipment to eliminate/reduce risks to the environment from spillages of oils, herbicides, pesticides and chemicals from such equipment -

REQUIRED SKILLS AND KNOWLEDGE

- vehicle loading crane, chainsaw, enterprise vehicles, explosive power tools
- Procedures for handling and control of spillages of herbicides
- Methods of disposing and storage of herbicides, pesticides and chemicals
- Methods of cleaning mobile plant, equipment and tools
- Recording of data

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence

need to be ‘rich’ in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures;

and

- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	<p>Identification of potential environmental hazards.</p> <p>Practical application of environmental legislation and codes of practice.</p> <p>Implement control measure(s) to eliminate/reduce environmental hazard(s)/incident.</p> <p>Apply incident reporting/recording/investigation procedures.</p> <p>Maintain a safe and clean workplace environment.</p> <p>Apply safe manual handling techniques.</p>
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake environmental and incident response procedures

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working in a variety of conditions and realistic environments

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace

UETTD RTP22A Establish and reinstate a power systems

transmission structure work site

UETTD RTP23A Erect power systems transmission structures

UETTD RTP24A Erect power systems transmission structure hardware

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to complying with environmental and incident response procedures.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Authorisation
- Confined space
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Entry Level – Cross Discipline Units.

UETTDREL14A Working safely near live electrical apparatus as a non-electrical worker

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers compliance with working safely up to the defined “safe approach distance” near energised electrical apparatus (inc. electrical powerlines) for non-electrical workers. It includes work functions that may be performed, such as vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely and complying with requirements and/or established procedures near live electrical apparatus by a non-electrical worker. Also included is the preparation of risk assessment control measures that encompass job safety assessment. It does not include any work that is or may be performed by other competent operatives within the defined “safe working zone”. The defined “safe working zone” is that so defined by relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for Safe work and access near live Electrical and Mechanical Apparatus.

Application of the Unit

Application of the Unit 2)

This competency standards unit shall apply to Transmission, Distribution, Rail Traction, Telecommunications and Vegetation Management Control industry sectors.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

There are no prerequisite competencies to this unit.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy".

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to work safely near live electrical apparatus as non-electrical worker	1.1	Instructions related to the work to be performed safely near live electrical apparatus as non-electrical worker are received and confirmed.
	1.2	Relevant requirements and established procedures to be followed and, relevant personnel to be communicated with for the work to be performed are identified.
	1.3	OHS policies and procedures to be followed for the work to be performed are received and confirmed.
	1.4	Suggestions to assist in meeting the safety requirements for working near live electrical apparatus as a non-electrical worker are made to others involved in the work.
	1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept

ELEMENT

PERFORMANCE CRITERIA

clear according to established procedures.

- | | | | |
|---|--|--|--|
| | 1.6 | Scope of responsibility and process of relevant work permit(s) issue is identified, received and confirmed according to requirements and established procedures. | |
| | 1.7 | Relevant responsibility associated with First Aid, Safety Observers and/or other related work safety procedures at the worksite are identified in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident. | |
| | 1.8 | Processes for identifying and reporting client issues to appropriate personnel in accordance with industry/acceptable /community standards are identified. | |
| | 1.9 | Site and the work schedule to be prepared are confirmed according to given instructions for a quality outcome and to minimise risk and damage to property, commerce, stock and individuals in accordance and established procedures. | |
| | 1.10 | Electricity infrastructure assets, related voltages and requirements for working safely near live electrical apparatus as non-electrical worker are identified. | |
| | 1.11 | Safe approach distances including any zones thereof that may apply, as defined in industry guidelines, requirements and/or established procedures for the intended work are confirmed. | |
| 2 | Carry out the work safely near live electrical apparatus as non-electrical worker. | 2.1 | OHS principles and practices to reduce the incidents of accidents are identified in accordance with given instructions, requirements and/or established procedures. |
| | | 2.2 | Working safely and complying with all safety requirements for working near live electrical apparatus as a non-electrical worker are followed in accordance with given instructions and |

ELEMENT	PERFORMANCE CRITERIA
	established routines/procedures.
	2.3 Processes for monitoring and reporting/referring hazards and OHS risks to the immediate authorised personnel for directions according to established procedures are followed.
	2.4 Non-routine events are referred to the immediate authorised personnel for directions according to established procedures.
	2.5 Unexpected events associated with working safely near live electrical apparatus as a non-electrical worker are responded to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met.
3 Complete the work safely near live electrical apparatus as non-electrical worker.	3.1 Work schedule and anomalies for completion and checking of the work are reported to authorised personnel in accordance with established procedures.
	3.2 Processes for reporting to authorised personnel accidents and/or incidents are confirmed in accordance with established procedures.
	3.3 Requirements for returning work permit(s) and/or access authorisation permits are confirmed.
	3.4 Appropriate personnel are notified of work completion according to established procedures.
	3.5 Works completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of working safely near live electrical apparatus as non electrical worker.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TEL14A Power Line Safety – Non Electrical Workers

Evidence shall show an understanding of power line safety – non electrical workers to an extent indicated by the following aspects:

T1 Basic electrical principles encompassing:

- Fundamental units - basic measurement of units
- Electrical characteristics of material: characteristics of solid materials, insulators; terms electrical charge, electrical current, electromagnetic forces
- Nature of electrical current and change - basic rules of electrical current flow
- Sources of Electricity: basic fundamentals of alternating current, direct current and single EMF source (induction)
- A simple circuit - circuit protection devices used on the network, effects of an open circuit, a closed circuit and a short circuit and earthing – using the ground as a form of conductor to return current back to a source
- Resistance - relationship between voltage and current and resistance (Ohms Law)
- Effects of current - physiological effects and protection for physiological effects; basic principle by which electrical current can result in the production of heat, light and electromagnetic fields and typical effects of current.
- Three phase and single phase power systems: star delta configurations, three phase star connections, relationship between line and phase voltages, three phase 4 wire systems - purpose of the neutral
- Consequences of short circuits - arc flash, ESI Protection schemes
- Magnetism - magnetic field patterns, concepts of electromagnetism, effects of electromagnetism and magnetic fields around straight conductors
- Hazards encountered in an ESI environment - touch and step potentials, electric shock, fire, chemicals, falls, safe use of tools and equipment.

T2 Transmission, distribution and rail power systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an

REQUIRED SKILLS AND KNOWLEDGE

overall power system - advantages/disadvantages, applications.

- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T3 Fundamentals for working safely near live electrical apparatus for non-electrical worker encompassing:

- Standards, guidelines/codes of practice, State/Territory/local government legislation, supply authority regulations and or enterprise requirements including relevant certification and licensing, applicable to working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker
- Definitions of terminologies - ‘safe working zone’, ‘risk assessment’, ‘safe approach distances zones’, ‘safe working distances’, ‘work permits’, ‘access authorisation permits’, ‘Technical standards’, ‘isolation procedures’ and ‘compliance requirements’
- OHS policies and procedures for working safely - duties of a safety observer, permit to work systems and isolation procedures, safe application of different types of tools and equipment and operation of mobile plant and machinery (e.g. EWP) near live electrical apparatus
- Techniques and precautions in undertaking different work functions and working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker (work functions that may be performed include, vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely near live electrical apparatus by a non-electrical worker)

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment,

such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Confirmation of the "safe working zone" for Safe work and access near live Electrical Apparatus Identification of the relevant technical standards. Acts, regulations and codes/guidelines Identification of established (Enterprise) procedures

B	All of the following:	<p>Confirmation of the principles of electricity, the three phase power system, electric shock and resuscitation, power system</p> <p>Recognition of aerial voltage systems</p> <p>Identification of Low Voltage Aerial Circuits</p> <p>Identification of High Voltage</p>
C	All of the following:	<p>Procedures in the event of an incident</p> <p>Events constituting an incident</p> <p>Procedures for responding to incidents</p> <p>Hazard and risk assessment procedure</p> <p>Conduct Work-site Hazard Assessment</p> <p>Confirmation of essential components of Hazard Assessment Checks</p> <p>Applying Hazard Identification in Electrical Work</p> <p>Confirmation of the Basic Safety Principles for Work on Electrical works</p> <p>Hazard Identification and Risk Assessment</p> <p>Hazard Control</p> <p>Risk Assessment and Management (JSAs) Control</p> <p>The Hierarchy of Controls including</p>

		Evaluation, Worksite Hazard and Risk Assessment Checklist, Pre-job Hazard Assessment Check (HAC) Items, Planned Inspection and Pre-Work Hazard Risk Assessment Form
D	All of the following:	Use of work permits and/or authorisation permits Sustainable energy principles and practices Possible affects of weather conditions on working near electrical apparatus as a non-electrical worker
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual work near live electrical apparatus

In addition to the resources listed above, in context of and specific

resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to safe working so defined by relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for Safe work and access near live Electrical Apparatus.

Work functions that may be performed, such as vegetation control, operation of cranes, elevating work platforms, excavators, concrete pumps etc, scaffolding, rigging, painting, and/or any other activity that requires working safely and complying with requirements and/or established procedures near live electrical apparatus by a non-electrical worker/

Working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker including an understanding of risk assessment control measures that encompass job safety assessment but excluding any work that is or may be performed by other competent operatives within the defined “safe working zone”.

Safe use of plant, equipment and tools within electrical environments including but not limited by the electricity supply infrastructure assets, infrastructure constructions and excavations including an understanding of safe approach distances zones/Safe Working Clearance, work permit(s) and/or access authorisation permits, technical standards and Industry Guidelines, rural applications, road construction, pavements and effect of inclement weather

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Appropriate authorities
- Assessing risk
- Authorisation
- Drawings and specifications
- Emergency
- Established procedures
- Hazards
- Identifying hazards
- Legislation
- Notification
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Entry Level – Cross Discipline Units.

UETTDREL15A Respond to power systems technical enquiries and requests

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers responding to enquiries of a technical nature using electricity supply industry (ESI) transmission, distribution and rail/tram network requirements, techniques and processes. It includes the relevant application of knowledge of relevant acts and regulations, codes of practice, guidelines and compliance regimes, and arrangements used to facilitate a response to enquiries or requests. The enquiries may be internal or with customers.

Note: examples include “storm codes” identification of key equipment, recognition of normal and abnormal industry situations, key processes and systems used in the industry such as, maps and the application of general safety and environmental processes and practices used in the industry.

Application of the Unit

Application of the Unit 2)

This competency standard unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety, electricity/ telecommunications/ gas/ water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

There are no prerequisite competencies to this unit.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare to respond to technical enquiries and requests	1.1	Instructions related to responding to enquiries using industry requirements, techniques and processes of a technical nature to be performed are received and confirmed
		1.2	Relevant requirements and established procedures to be followed and, relevant personnel (including internal and/or customer) to be communicated with for the work to be performed are identified
		1.3	OHS policies and procedures to be followed for the work to be performed are received and confirmed.
		1.4	Suggestions to assist in meeting the safety requirements for responding to technical enquiries and requests are made to others involved in the work.
		1.5	Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept

ELEMENT**PERFORMANCE CRITERIA**

- clear according to established procedures.
- 1.6 Scope of responsibility and process of relevant work permit(s) issue is identified, received and confirmed according to requirements and established procedures
- 1.7 Relevant responsibility associated with First Aid, Safety Observers and/or other related work safety procedures at the worksite are identified in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident
- 1.8 Processes for identifying and reporting client (including internal and customer) issues to appropriate personnel in accordance with industry/acceptable /community standards are identified
- 1.9 Workplace and the work schedule is confirmed according to given instructions for a quality outcome and to minimise risk and damage to property, commerce, stock and individuals in accordance and established procedures
- 1.10 Electricity infrastructure assets, related voltages and requirements, where applicable, for working safely near live electrical apparatus as non-electrical worker are identified
- 1.11 Safe approach distances including any zones thereof that may apply, as defined in industry guidelines, requirements and/or established procedures for the intended work are confirmed
- 2 Carry out responses to technical enquiries and requests
- 2.1 OHS principles and practices to reduce the incidents of accidents are identified in accordance with given instructions, requirements and/or established procedures
- 2.2 Enquiries and/or requests are responded to according to requirements and established procedures, and in a timely manner
- 2.3 Working safely and complying with all safety requirements for responding to technical

ELEMENT**PERFORMANCE CRITERIA**

		enquiries and requests are followed in accordance with given instructions and established routines/procedures
	2.4	Processes for monitoring and reporting/referring hazards and OHS risks to the immediate authorised personnel for directions according to established procedures are followed
	2.5	Non-routine events are referred to the immediate authorised personnel for directions according to established procedures
	2.6	Essential knowledge and associated skills are applied in the application of responding to technical enquiries and requests to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements
	2.7	Unexpected events associated with enquiries and/or requests of a technical nature are responded to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met.
3	Complete responses to technical enquiries and requests	3.1 Work schedule and anomalies for completion and checking of the work are reported to authorised personnel in accordance with established procedures
		3.2 Processes for reporting to authorised personnel accidents and/or incidents are confirmed in accordance with established procedures
		3.3 Requirements for returning work permit(s) and/or access authorisation permits, where applicable, are confirmed
		3.4 Appropriate personnel are notified of work completion according to established procedures.
		3.5 Works completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of responding to technical enquiries and requests has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TEL15A ESI power systems overview

Evidence shall show an understanding of ESI power systems structures and operations to an extent indicated by the following aspects:

T1 Engineering applications of material properties encompassing:

- Identification and classification of engineering materials including material properties
- Types and applications - properties of tensile strength, effects of temperature on the expansion of metals, ductibility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers

T2 Generation power systems encompassing:

- Methods of generating electricity - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
- Relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
- The purpose and features of typical types of co-generation systems

T3 Transmission, distribution and rail power systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T4 Fundamentals for working safely near live electrical apparatus encompassing:

- Standards, guidelines/codes of practice, State/Territory/local government legislation, supply authority regulations and or enterprise requirements including

REQUIRED SKILLS AND KNOWLEDGE

relevant certification and licensing, applicable to working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker

- Definitions of terminologies - ‘safe working zone’ ‘risk assessment’, ‘safe approach distances zones’, ‘safe working distances’, ‘work permits’, ‘access authorisation permits’, ‘Technical standards’ ‘isolation procedures’ and ‘compliance requirements’
- OHS policies and procedures for working safely - emergency response and First Aid procedures such as CPR, roles and responsibilities of employers, employees and other parties under OHS legislation, personal protective equipment, identifying hazards, assessing and controlling OHS risks, first aid procedures, duties of a safety observer, working at heights/confined spaces, permit to work systems and isolation procedures, safe application of different types of tools and equipment
- Operation of mobile plant and machinery (e.g. EWP) near live electrical apparatus
- Electricity supply infrastructure assets and voltages
- Techniques and precautions in undertaking different work functions and working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker (work functions that may be performed include, vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely near live electrical apparatus by a non-electrical worker)

T5 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T6 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation

REQUIRED SKILLS AND KNOWLEDGE

and First Aid procedures

- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T7 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control

KS02-TEL15A Energy sector technical enquiries and requests

Evidence shall show an understanding of energy sector technical enquiries and requests to an extent indicated by the following aspects:

T1 Basic network operating principles and parameters encompassing:

- Sources of electricity
- Basic principles of electricity, the three phase power system, electric shock and resuscitation, power system
- Aerial and underground voltage systems
- Low Voltage network systems
- High Voltage network systems
- Equipment used in a network system
- MEN system
- Hazards and risks in a network system - risk to life, property or commerce, fallen wires/equipment, fires,
- Voltage gradients - step potential, touch potential — (transferred earth potentials)

T2 Applicable legislation, regulations, standards, industry codes, industry guidelines, and policies encompassing:

- relevant sections of legislation used
- relevant sections of international or Australian standards used
- relevant sections of Industry codes used
- relevant sections of Industry guidelines used
- relevant sections of policies used
- relevant sections of advisory information used

REQUIRED SKILLS AND KNOWLEDGE

- T3 Incident event procedures
- T4 Incidents constituting an event
- T5 Incidence response procedures
- T6 General Hazard and risk assessment principles and procedures
- T7 Principles for conducting work-site Hazard Assessment checks,
- T8 Basic safety principles and hazard control measures
- T9 Key industry terms and performance indicators and measures used - SAIDI — System Average Interruption Duration Index, SAIFI - System Average Interruption Frequency Index, MAIFI — Momentary Average Interruption Frequency Index, CAIDI — Customer Average Interruption Duration Index; Network owners and operators
- T10 Critical industry codes used - include storm code emergencies
- T11 Key equipment used in the industry - industry-specific equipment, switchgear, transformers, aerial conductors, insulators, poles, mobile plant, mobile equipment
- T12 Normal and abnormal industry situations, key processes and systems used in the industry - anomalies report, critical system/network failures/anomalies and key processes and systems used in the industry e.g. maps, drawings, as well as safety and environment processes and practices, communications systems; fires; automatic switching; emergencies; security breaches
- T13 Techniques and processes for responding to a technical enquiry or request in accordance with established procedures in a timely manner - ethical performance; assessing applications, enquiries, or requests; using technology and media including catalogues to assist assessments; client quality service; reflecting on the completed enquiry or request
- T14 Enquiries may be internal or with customers encompassing:
- customer protocols
 - legal requirements and obligations for property access
- T15 Relevant heritage and environmental requirements

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	<ul style="list-style-type: none"> - Confirmation of the “safe working zone” for Safe work and access near live Electrical and Mechanical Apparatus - Application of knowledge of relevant acts and regulations, codes of practice, guidelines and compliance regimes, and arrangements used - Identification of established (Enterprise) procedures and processes
B	All of the following:	<ul style="list-style-type: none"> - Confirmation of the principles of electricity, the three phase power system, electric shock and resuscitation, power system - Recognition of aerial voltage systems - Identification of Low Voltage Networks - Identification of High Voltage Networks
C	All of the following:	<ul style="list-style-type: none"> - Procedures in the event of an incident - Events constituting an incident - Procedures for responding to incidents - Hazard and risk assessment general principles and procedures - Principles for

		conducting work-site Hazard Assessment checks, basic safety principles and hazard control measures
D	All of the following:	<ul style="list-style-type: none"> - Purpose and use of work permits and/or authorisation permits - Sustainable energy principles and practices - Possible affects of weather conditions on working near electrical apparatus as a non-electrical worker
E	All of the following:	<ul style="list-style-type: none"> Knowledge of critical codes in the industry – e.g. storm code emergencies - Identification of key equipment used in the industry - Recognition of normal and abnormal industry situations
F	All of the following:	<ul style="list-style-type: none"> - Provision of a response to a technical enquiry or request in accordance with established procedures and timely manner
G	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual work near live electrical apparatus

Method of assessment 9.4)

This competency standard unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to safe working so defined by relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for responding to technical enquires and requests.

Work functions may include the application of knowledge of electricity supply industry (ESI) transmission, distribution or rail/tram network requirements, techniques and processes and the application of knowledge of relevant acts and regulations, codes of practice, guidelines and compliance regimes, and arrangements used to facilitate a response to enquiries or requests. Examples include knowledge of critical codes in the industry – e.g. storm code emergencies, identification of key equipment, recognition of normal and abnormal industry situations, key processes and systems used in the industry such as, maps, catalogues, and the application of general safety and environmental processes and practices used in the industry.

Knowledge and identification of key equipment used in industry. Questioning (customer information gathering techniques) including observance of equipment, identification of anomalies from the norm and reporting of information. Recognition of normal and abnormal industry situations may include equipment, performance indicators, anomalies report, knowledge of critical system/network failures/anomalies and knowledge of key processes and systems used in the industry e.g. maps, drawings etc., and safety and environment processes and practices used in the industry.

Note:

Examples performance indicators are - SAIDI - System Average Interruption Duration Index, SAIFI - System Average Interruption Frequency Index, MAIFI - Momentary Average Interruption Frequency Index, CAIDI - Customer Average Interruption Duration Index

Enquiries may be internal or with customers.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Appropriate authorities
- Assessing risk
- Authorisation
- Drawings and specifications
- Emergency
- Established procedures.

RANGE STATEMENT

- Hazards
- Identifying hazards
- Legislation
- Internal and external customers
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Work clearance systems.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Entry Level – Cross Discipline Units

UETTDREL16A Working safely near live electrical apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers compliance with working safely up to the defined “safe approach distance” near energised electrical apparatus (inc. electrical powerlines) for electrical worker. It includes work functions that may be performed, such as vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely and complying with requirements and/or established procedures near live electrical apparatus by an electrical worker. Also included is the preparation of risk assessment control measures that encompass job safety assessment. It does not include any work that is or may be performed by other competent operatives within the defined “safe working zone”. The defined “safe working zone” is that so defined by relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for Safe work and access near live Electrical and Mechanical Apparatus.

Application of the Unit

Application of the Unit 2)

This competency standards unit shall apply to Transmission, Distribution, Rail Traction, Telecommunications and Vegetation Management Control industry sectors.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

There are no prerequisite competencies to this unit.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare to work safely near live electrical apparatus as electrical worker	1.1	Instructions related to the work to be performed safely near live electrical apparatus as electrical worker are received and confirmed.
		1.2	Relevant requirements and established procedures to be followed and, relevant personnel to be communicated with for the work to be performed are identified.
		1.3	OHS policies and procedures to be followed for the work to be performed are received and confirmed.
		1.4	Suggestions to assist in meeting the safety requirements for working near live electrical apparatus as an electrical worker are made to others involved in the work.
		1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.

ELEMENT	PERFORMANCE CRITERIA
1.6	Scope of responsibility and process of relevant work permit(s) issue is identified, received and confirmed according to requirements and established procedures.
1.7	Relevant responsibility associated with First Aid, Safety Observers and/or other related work safety procedures at the worksite are identified in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident.
1.8	Processes for identifying and reporting client issues to appropriate personnel in accordance with industry/acceptable /community standards are identified.
1.9	Site and the work schedule to be prepared are confirmed according to given instructions for a quality outcome and to minimise risk and damage to property, commerce, stock and individuals in accordance and established procedures.
1.10	Electricity infrastructure assets, related voltages and requirements for working safely near live electrical apparatus as electrical worker are identified.
1.11	Safe approach distances including any zones thereof that may apply, as defined in industry guidelines, requirements and/or established procedures for the intended work are confirmed.
2 Carry out the work safely near live electrical apparatus as electrical worker.	<p>2.1 OHS principles and practices to reduce the incidents of accidents are identified in accordance with given instructions, requirements and/or established procedures.</p> <p>2.2 Working safely and complying with all safety requirements for working near live electrical apparatus as an electrical worker are followed in accordance with given instructions and established routines/procedures.</p> <p>2.3 Processes for monitoring and reporting/referring hazards and OHS risks to the immediate</p>

ELEMENT	PERFORMANCE CRITERIA
	authorised personnel for directions according to established procedures are followed.
	2.4 Non-routine events are referred to the immediate authorised personnel for directions according to established procedures.
	2.5 Unexpected events associated with working safely near live electrical apparatus as an electrical worker are responded to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met.
3 Complete the work safely near live electrical apparatus as electrical worker.	3.1 Work schedule and anomalies for completion and checking of the work are reported to authorised personnel in accordance with established procedures.
	3.2 Processes for reporting to authorised personnel accidents and/or incidents are confirmed in accordance with established procedures.
	3.3 Requirements for returning work permit(s) and/or access authorisation permits are confirmed.
	3.4 Appropriate personnel are notified of work completion according to established procedures.
	3.5 Works completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of working safely near live electrical apparatus as electrical worker.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TEL16A ESI safe work practices near live electrical apparatus

Evidence shall show an understanding of ESI safe work practices near live electrical apparatus to an extent indicated by the following aspects:

T1 Electrical safety and principles encompassing:

- Hazards encountered in an electrical environment and safety procedures for dealing with them - types of hazards (hazards include electrical shock, fire from an electrical source, chemical hazards and fall hazards.), factors indicating general unsafe work practices and conditions, safety practices in the use of common tools and plant.
- Rescue techniques and first aid treatment of an electric shock victim - methods to rescue an electrical shock victim in contact with live equipment or conductors, accepted first aid treatment for burns, bleeding and shock, procedures for conducting EAR and CPR.
- Procedures for dealing with fires and hazardous chemicals associated with electrical equipment - selection and use of different types of equipment used to fight fires associated with electrical equipment, procedures for dealing with a fire associated with electrical equipment, procedures for dealing with PCBs.
- Basic circuit components and state the function of each - sources of electrical supply, control switches, types and functions of resistive consuming devices, basic circuit components symbols used in electrical diagrams.
- Connection of basic electrical circuits and measurement of circuit parameters - connection of components that make up a single-source single-load circuit, relationship between voltage and current in such circuits, consequences of a short-circuit and an open-circuit.
- Determining the voltage, current and resistance - calculation methods, measurement methods.
- Cable and conductor terminations to Australian/New Zealand standards - types of terminations, cable conductor preparation, prepare conductor for termination, termination method (conductor terminations include soldered and pressure types).

T2 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal

REQUIRED SKILLS AND KNOWLEDGE

components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders

- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T3 Fundamentals for working safely near live electrical apparatus encompassing:

- Standards, guidelines/codes of practice, State/Territory/local government legislation, supply authority regulations and or enterprise requirements including relevant certification and licensing, applicable to working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker
- Definitions of terminologies - ‘safe working zone’ ‘risk assessment’, ‘safe approach distances zones’, ‘safe working distances’.’ work permits’, access authorisation permits’, ‘Technical standards’ ‘isolation procedures’ and compliance requirements’
- OHS policies and procedures for working safely - emergency response and First Aid procedures such as CPR, roles and responsibilities of employers, employees and other parties under OHS legislation, personal protective equipment, identifying hazards, assessing and controlling OHS risks, first aid procedures, duties of a safety observer, working at heights/confined spaces, permit to work systems and isolation procedures, safe application of different types of tools and equipment
- Operation of mobile plant and machinery (e.g. EWP) near live electrical apparatus
- Electricity supply infrastructure assets and voltages
- Techniques and precautions in undertaking different work functions and working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker - work functions that may be performed include, vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely near live electrical apparatus by a non-electrical worker.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET1211”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	<p>Confirmation of the "safe working zone" for Safe work and access near live Electrical Apparatus</p> <p>Identification of the relevant technical standards. Acts, regulations and codes/guidelines</p> <p>Identification of established (Enterprise) procedures</p>
B	All of the following:	<p>Confirmation of the principles of electricity, the three phase power system, electric shock and resuscitation, power system</p> <p>Recognition of aerial voltage systems</p> <p>Identification of Low Voltage Aerial Circuits</p> <p>Identification of High Voltage</p>
C	All of the following:	<p>Procedures in the event of an incident</p> <p>Events constituting an incident</p> <p>Procedures for responding to incidents</p> <p>Hazard and risk assessment procedure</p> <p>Conduct Work-site Hazard Assessment</p> <p>Confirmation of essential components of Hazard Assessment Checks</p> <p>Applying Hazard</p>

		<p>Identification in Electrical Work</p> <p>Confirmation of the Basic Safety Principles for Work on Electrical works</p> <p>Hazard Identification and Risk Assessment</p> <p>Hazard Control</p> <p>Risk Assessment and Management (JSAs) Control</p> <p>The Hierarchy of Controls including Evaluation, Worksite Hazard and Risk Assessment Checklist, Pre-job Hazard Assessment Check (HAC) Items, Planned Inspection and Pre-Work Hazard Risk Assessment Form</p>
D	All of the following:	<p>Use of work permits and/or authorisation permits</p> <p>Sustainable energy principles and practices</p> <p>Possible affects of weather conditions on working near electrical apparatus as a electrical worker</p>
E	At least one occasion	<p>Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.</p>

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual work near live electrical apparatus

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to safe working so defined by relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for Safe work and access near live Electrical Apparatus.

Work functions that may be performed, such as vegetation control, operation of cranes, elevating work platforms, excavators, concrete pumps etc, scaffolding, rigging, painting, and/or any other activity that requires working safely and complying with requirements and/or established procedures near live electrical apparatus by a electrical worker/

Working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for electrical worker including an understanding of risk assessment control measures that encompass job safety assessment but excluding any work that is or may be performed by other competent operatives within the defined “safe working zone”.

Safe use of plant, equipment and tools within electrical environments including but not limited by the electricity supply infrastructure assets, infrastructure constructions and excavations including an understanding of safe approach distances zones/Safe Working Clearance, work permit(s) and/or access authorisation permits, technical standards and Industry Guidelines, rural applications, road construction, pavements and effect of inclement weather

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Appropriate authorities
- Assessing risk
- Authorisation
- Drawings and specifications
- Emergency
- Established procedures
- Hazards
- Identifying hazards
- Legislation
- Notification
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Entry Level – Cross Discipline Units.

UETTDREL17A Operate asset inspection machinery and equipment near live electrical apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the operation and routine maintenance of machinery and equipment used near live electrical apparatus. Also included is the preparation of risk assessment control measures that encompass job safety assessment. It also includes compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for safe use of equipment near live electrical and mechanical apparatus.

Application of the Unit

Application of the Unit 2)

This competency standards unit would be applied by asset inspectors engaged in the regular and methodical inspection and treatment poles and inspection of electrical apparatus in the transmission and distribution industry sector

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice

3)

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures
UETTDREL14A	Working safe near live electrical apparatus as a non-electrical worker

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in

Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
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Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to operate machinery and equipment near live electrical apparatus.	1.1	Works instructions are received, analysed and confirmed, if necessary by site inspection.
	1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3	OHS policies and procedures related to requirements and established procedures for the operation of machinery and equipment near live electrical apparatus that are used on the poles are obtained and confirmed.
	1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with

ELEMENT

PERFORMANCE CRITERIA

established procedures.

- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored according to established procedures
- 1.6 Relevant work permits are obtained, where necessary, to access and perform work according to requirements and/or established procedures.
- 1.7 Resources including machinery, equipment, and personal protective equipment required for the job are obtained and, confirmed in working order.
- 1.8 Relevant person responsible for First Aid and related work safety procedures at the worksite is confirmed in accordance with established procedures to ensure safety measures are followed in the instance of an incident.
- 1.9 Liaison and communication issues with appropriate personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work are fully briefed and respective responsibilities confirmed in accordance with established procedures, where necessary.
- 1.12 Traffic management plan is identified and road signs, barriers and warning devices are positioned in accordance with requirements, where necessary.
- 1.13 Pre-operational checks are undertaken to confirm safe and correct operation of machinery and equipment for safe use near live electrical apparatus according to requirements and established procedures

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the operation of machinery and equipment near live electrical apparatus	<p>2.1 OHS and sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and established procedures.</p> <p>2.2 Machinery and equipment is selected appropriate to the task requirements, and used to produce desired outcome.</p> <p>2.3 Use of machinery and equipment, techniques and practices are safely followed in accordance with given instructions and according to requirements confirmed to eliminate the prospects of incidents.</p> <p>2.4 Essential knowledge and associated skills for the usage of machinery and equipment near live electrical apparatus to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements</p> <p>2.5 Hazard warnings and safety signs are recognised and hazards and identified and OHS risks are reported/ to the immediate appropriate personnel for directions according to established procedures.</p> <p>2.6 Machinery and equipment is safely operated near live electrical apparatus in accordance with the work schedule, requirements, given instructions and established procedures.</p> <p>2.7 Non-routine events are referred to the immediate appropriate personnel for directions according to established procedures.</p> <p>2.8 Problems associated with the operation of machinery and equipment near live electrical apparatus are attended to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met.</p> <p>2.9 Unplanned events during the inspection and treatment of poles and structures are undertaken</p>

ELEMENT

PERFORMANCE CRITERIA

- within the scope of established procedures.
- 2.10 Known solutions to a variety of problems are applied using acquired knowledge and associated skills.
- 2.11 On-going checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 3 Complete the operation of machinery and equipment near live electrical apparatus
- 3.1 Work undertaken is checked against work schedule and anomalies reported to appropriate personnel in accordance with established procedures.
- 3.2 Accidents and/or incidents are actioned and reported to appropriate personnel in accordance with established procedures
- 3.3 Work site is rehabilitated, cleaned-up, sustainable energy principles and practices applied, and made safe in accordance with given instructions and established procedures or agreed standards.
- 3.4 Machinery, equipment, tools and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Appropriate personnel are notified of work completion according to established procedures.
- 3.6 Post-operational checks, minor maintenance and/or relevant documentation of machinery and equipment are conducted according to requirements.
- 3.7 Requirements for returning work permit(s) and/or access authorisation permits are confirmed, where applicable.
- 3.8 Works completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of the operation of asset inspection machinery and equipment near live electrical apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TEL17A Asset inspection plant, machinery and equipment

Evidence shall show an understanding of asset inspection plant, machinery and equipment to an extent indicated by the following aspects.

T1 Assets inspection safety requirements encompassing:

- The legal requirements covering OHS in the work place
- Requirements for personal safety in the workplace
- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with safe use of enterprise vehicles
- Working safely with electrical tools and equipment near electrical apparatus
- Identification of Hazards and risks associated with working on / near live electrical apparatus
- Use and application of Personal Protective Equipment (PPE), selecting and using Personal Protecting Equipment (PPE)
- Safe work practices and procedures

T2 Asset inspection machinery and equipment encompassing:

- Reading and following information on standard operating procedures
- Following verbal instructions
- Selecting machinery and equipment appropriate to the task
- Identifying machinery and equipment defects
- Maintaining machinery and equipment using appropriate techniques
- Safe use of enterprise vehicles
- Operation of machinery and equipment - pre-operational checks, safe use of machinery and equipment, safe transporting and storage procedures according to manufacturers' / standard operating procedures
- Adjustments/alignments to a range of machinery and equipment
- Common faults and/or defects found in a range of machinery and equipment
- Procedures for marking unsafe or faulty machinery and equipment for repair
- Procedures for the safe use of hand and power tools
- Routine maintenance requirements of a range of machinery, equipment and hand and power tools
- Storage location and procedures for a range of machinery and equipment
- Hazards/control measures associated with the use of a range machinery and

REQUIRED SKILLS AND KNOWLEDGE

equipment

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to

safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines - UET12" . Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Confirm operational knowledge associated with the operation of control machinery and equipment near live electrical apparatus in all of the following:	<p>Recognition of aerial voltage systems.</p> <p>Identification of Low Voltage Aerial Circuits.</p> <p>Identification of High Voltage Aerial Circuits.</p> <p>Safe approach distance so defined by relevant authorities.</p> <p>Use of technical standards, acts, regulations, codes /guidelines and established/enterprise/asset owner's procedures.</p> <p>System Control – Information required and functions.</p> <p>Vicinity Permit – Information required and functions.</p> <p>Confirm environmental principals and procedures</p>
B	Confirm safe practices associated with the operation of control machinery and equipment near live electrical apparatus in all of the following:	<p>OHS safety practices and procedures.</p> <p>Electric shock and resuscitation.</p> <p>Events constituting an incident.</p> <p>Procedures in the event of/responding to,</p>

		<p>incidents.</p> <p>Methods of identifying hazards.</p> <p>Risk assessment procedures.</p> <p>Selection of the best position for monitoring and controlling work.</p> <p>Constant analysis and decision making relevant to the safety of the work, taking into account prevailing site conditions (lay of the land) and on-going weather conditions</p>
C	<p>Confirm the safe operation of machinery and equipment in varying conditions and weather near live electrical apparatus and undertake pre and post operational checks, inspections in at least 4 of the following:</p>	<p>Chainsaws, Brush Cutters, Power Pruners, Powered Drills, *Augers, Air Compressors, Generators, Jack Hammers, Demolition saws, Measuring devices, Extendable mounted cameras</p> <p>(* Must do)</p>
D	<p>At least one occasion</p>	<p>Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic</p>

		assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual work near live electrical apparatus

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any

other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

Machinery, equipment may include:

- Power operated tools such as chainsaws, brush cutters, power pruners, powered drills, augers, air compressors, generators, jack hammers, demolition saws, measuring devices, extendable mounted cameras
- Excludes machinery and equipment that encompass driving and associated licenses, such as slashers, boom-operated insulated elevating work platforms, excavator, back hoes and the like.

Tools may include (but not limited to):

- Hand tools such as hacksaws, hammers, screwdrivers, sockets, wrenches, scrapers, chisels, files, tape measures, bolt cutters, knives and other related associated

Near Live electrical apparatus may include (but not limited to):

- Single Wire Earth Return (SWER), High Voltage (HV) and Low Voltage (LV) overhead conductors and cables, underground cables (as attached to the poles) and overhead transition points, conductor terminations, insulators, conductor ties, cross arms, cross arm mountings and brackets, switches, HV fuses and fuse carriers, pole mounted transformers, sub stations, air-break switches, surge diverters, auto reclose relays, possum guards, earth guards, angle of the pole, lights, bolts and associated pole fixings.
- Excludes any work that is or may be performed by other competent and / or licensed operatives

OHS policies and procedures may include:

- The preparation of risk assessment control measures that encompass job safety assessment and includes traffic control measures and compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for safe use of equipment near live electrical apparatus.

Permits may include:

- Safe Approach Distances Zones / Safe Working Clearance, Work Permit(s) and/or Access Authorisation Permits and those required under Technical standards and Industry

RANGE STATEMENT

Guidelines.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Entry Level – Cross Discipline Units.

UETTDREL18A Inspect and treat poles and inspect electrical apparatus

Modification History

Release	Action	Core/Elective	Details	Points
2	Edit	N/A	Corrected "Evidence shall show that knowledge has been acquired of" statement on Required Skills and Knowledge	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the treatment of poles and the inspection of poles and electrical apparatus in accordance with enterprise procedures.

It includes work associated with testing or examining, at eye level to below ground and the visual checking above ground of the cross arm, conductors, hardware and equipment attached with the use of the un-aided eye, binoculars and electronic vision equipment so as to determine the integrity of the poles, structures and hardware attached to them.

It also encompasses the completion of inspection reports and the updating of records to enterprise requirements.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication

Application of the Unit

Application of the Unit 2)

This competency standards unit would be applied by asset inspectors engaged in the regular and methodical inspection and treatment poles and inspection of

electrical apparatus in the transmission and distribution industry sector

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures

Prerequisite Unit(s) 4)

UETTDREL14A Working safe near live electrical apparatus as a non-electrical worker

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to Inspect and treat poles and inspect electrical apparatus.	1.1 Works instructions are received, analysed and confirmed, if necessary by site inspection.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites
	1.3 OHS policies and procedures related to requirements and established procedures for the visual inspection and treatment of poles and structures, and the inspection of overhead structures and electrical apparatus used on the poles are obtained and confirmed.
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored according to established procedures.
	1.6 Relevant work permits are obtained, where necessary, to access and perform work according to requirements and/or established procedures.
	1.7 Resources including equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
	1.8 Relevant person responsible for First Aid and / or related work safety procedures at the worksite are confirmed in accordance with established procedures to ensure safety measures are followed in the instance of an incident
	1.9 Liaison and communication issues with appropriate personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property,

ELEMENT	PERFORMANCE CRITERIA
	commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work are fully briefed and respective responsibilities confirmed in accordance with established procedures, where necessary.
	1.12 Traffic management plan is identified and road signs, barriers and warning devices are positioned in accordance with requirements, where necessary.
2 Conduct inspection and treatment of poles and inspect electrical apparatus	2.1 OHS and sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and established procedures.
	2.2 Tools and equipment are selected appropriate to the task requirements and are used to produce desired outcomes.
	2.3 Lifting, and use of power tools/equipment, techniques and practices are safely followed in accordance with established procedures.
	2.4 Essential knowledge and associated skills are applied for the inspection of poles and electrical apparatus, and the safe treatment of poles and structures to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.5 Hazard warnings and safety signs are recognised, hazards identified and OHS risks reported to immediate appropriate personnel for directions according to established procedures.
	2.6 Visual inspection of poles and overhead structures, conductors, cables and electrical apparatus used on poles and / or structures is carried out in accordance with the work schedule to requirements and establish procedures.
	2.7 Poles and / or structures are tested or examined from approximately eye level to below ground to

ELEMENT	PERFORMANCE CRITERIA
	requirements and established procedures.
	2.8 Visual checks are performed to identify fungal activity, dry rot, termite and borer infestation in accordance with established procedures, where required.
	2.9 Treatment of poles and/or structures is carried out, in accordance with the work schedule to requirements and established procedures.
	2.10 Defective or suspect poles are identified according to established procedures.
	2.11 Unplanned events during the inspection of poles, structures electrical apparatus are undertaken within the scope of established procedures.
	2.12 Known solutions to a variety of problems are applied using acquired knowledge and associated skills.
	2.13 On-going checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the Inspection and treatment of poles and inspect electrical apparatus	3.1 Work undertaken is checked against works schedule for conformance with requirements, with anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage according to established procedures.
	3.5 Unsafe or faulty tools are identified and marked for repair in accordance with established procedures before, during and after use.

ELEMENT**PERFORMANCE CRITERIA**

- 3.6 Relevant work permit(s) are signed off and poles and structures are returned to service in accordance with requirements, where applicable.
- 3.7 Works completion records, reports and/or documentation and information are finalised and processed and appropriate personnel notified to enterprise requirements.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of inspecting poles and electrical apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TEL18A Inspection of poles and of electrical apparatus

Evidence shall show an understanding of inspection of poles and of electrical apparatus to an extent indicated by the following aspects:

T1 Poles and of electrical apparatus inspection safety requirements encompassing:

- Working safely with machinery and equipment near live electrical apparatus
- An understanding of working safely on an around electrical equipment through the application of risk management principles and control measures.
- Selecting and using appropriate personal safety equipment
- Implementing emergency procedures for the rescue of an electric shock victim
- Providing emergency first aid for an electric shock victim
- Selecting and using Personal Protecting Equipment (PPE)
- Safe handling and use of chemical treatments
- Visual checking and treatment of poles and structures
- Inspecting of overhead structures and electrical apparatus used on poles and / or structures
- Documenting inspection findings in accordance with enterprise requirements.

T2 Inspection of poles and electrical apparatus/equipment encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Characteristics of wood used for structures within the electrical distribution system - relationship between timber and water, faults that occur that influence the integrity of the structure, effects and types of fungal activity, effects of termite and borer activity, effects of rot
- Deterioration prevention techniques - relationship between steel, concrete and wood, inspection procedures for deterioration, deterioration prevention procedures in steel, concrete and wood, procedures for the repair of deterioration in steel, concrete and wood
- Ground line inspection procedures of electrical distribution structures - requirements for pole inspection on electrical distribution structures, use of specific equipment and testing devices during testing/inspection, methods of recording data
- Overhead line inspection procedures of electrical distribution structures - methods and requirements for overhead inspection on electrical distribution structures

REQUIRED SKILLS AND KNOWLEDGE

including cables, conductors and apparatus, clearances for overhead conductors, cables and structures, use of specific equipment and testing devices during testing/inspection, methods of recording data.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing

on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Inspect and test at least four of the following:	Wood Steel Concrete Composite Reinforced Poles
B	Conduct all of the following:	Drill test Non intrusive test
C	Undertake all of the following activities:	Chemical treatment Reinforcement(remove) Fit a sleeve to stays/guys
D	Inspect all of the following:	Poles and structures, Overhead conductors/cables, Underground/overhead transition points, Electrical equipment, Hardware, Earthing systems,
E	Complete inspection reports and update records for all of the following:	Poles and structures, Overhead conductors/cables, Underground/overhead transition points, Electrical equipment, Hardware, Earthing systems,
F	Using at least two of the	Un-aided eye,

	following:	Binoculars, Electronic data capture using infrared and/or digital video camera and / or computer, Sonic tester, Drill
G	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual work near live electrical apparatus

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of Assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all

necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Visual inspection may include:**
- Inspection may be carried out on foot or by conventional ground-based vehicle.
 - Inspection techniques may include the use of un-aided eye, binoculars, electronic data capture using infrared and/or digital video camera, computers, sonic testing devices and drill testing.
 - Items to be inspected may include overhead poles, structures and / or electrical apparatus, but not transmission towers
- Electrical apparatus may include:**
- Single Wire Earth Return (SWER), High Voltage (HV) and Low Voltage (LV) overhead conductors and cables, underground cables (as attached to the poles) and overhead transition points, conductor terminations, insulators, conductor ties, cross arms, cross arm mountings and brackets, switches, HV fuses and fuse carriers, pole mounted transformers, sub stations, air-break switches, surge diverters, auto reclose relays, possum guards, earth guards, angle of the pole, lights, bolts and associated pole fixings.
- Work permits may include:**
- Safe Approach Distances Zones / Safe Working Clearance, Work Permit(s) and/or Access Authorisation Permits and those required under Technical standards and Industry Guidelines.
- Tools / equipment may include:**
- Power operated tools such as chainsaws, brush cutters, power pruners, powered drills, augers, air compressors, generators, jack hammers, demolition saws, measuring devices, extendable mounted cameras
 - Excludes machinery and equipment that encompass driving and associated licenses, such as slashers, boom-operated insulated elevating work platforms, excavator, back hoes and the like.
 - Hand tools such as hacksaws, hammers, screwdrivers, sockets, wrenches, scrapers, chisels, files, tape measures,

RANGE STATEMENT

- Inspection may include:**
- bolt cutters, knives and other related associated
 - On foot or by conventional ground-based vehicle and /or from the air. Aircraft maybe helicopter or fixed wing types.
- Treatment of poles and structures may include:**
- The chemical treatment for the prevention of pole deterioration through the insertion of chemical preservatives (i.e. Polesaver) into the base of wooden poles

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Entry Level – Cross Discipline Units.

UETTDREL19A Identify and interpret characteristics of electrical apparatus associated with power industry assets

Modification History

Release	Action	Core/Elective	Details	Points
2	Edit	N/A	Corrected "Evidence shall show that knowledge has been acquired of" statement on Required Skills and Knowledge	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit shall be demonstrated in relation to the identification and interpretation of electrical apparatus associated with asset inspection, including interpreting the operational characteristics of the electrical apparatus, pole top structures, attachments and the relationship of the various equipment, including the association the equipment has in the correct functioning of the distribution and/or transmission system

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Application of the Unit

Application of the Unit 2)

This competency standards unit would be applied by asset inspectors engaged in the regular and methodical inspection and treatment poles and inspection of electrical apparatus in the transmission and distribution industry sector

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures
UETTDREL14A	Working safe near live electrical apparatus as a non-electrical worker

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
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Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to identify and interpret characteristics of electrical apparatus associated with power industry assets.	1.1	Instructions for identifying the electrical apparatus undergoing asset inspection are communicated and confirmed to ensure clear understanding.
	1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.

ELEMENT

PERFORMANCE CRITERIA

- 1.3 OHS policies and procedures related to requirements and established procedures for the visual checking and treatment of poles and structures, and the inspection of overhead structures and electrical apparatus used on the poles are obtained and confirmed.
- 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored according to established procedures.
- 1.6 Relevant work permits are obtained, where necessary, to access and perform work according to requirements and/or established procedures.
- 1.7 Schedule(s) for identifying poles and structures, and the inspection of overhead structures and electrical apparatus including practices for working safely are confirmed in accordance with instructions and requirements.
- 1.8 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.9 Relevant person responsible for First Aid and / or related work safety procedures at the worksite are confirmed in accordance with established procedures to ensure safety measures are followed in the instance of an incident.
- 1.10 Liaison and communication issues with appropriate personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with

ELEMENT	PERFORMANCE CRITERIA
	established procedures.
	1.12 Personnel participating in the work are fully briefed and respective responsibilities confirmed in accordance with established procedures, where necessary.
	1.13 Traffic management plan is identified and road signs, barriers and warning devices are positioned in accordance with requirements, where necessary.
2 Identify and interpret characteristics of electrical apparatus associated with power industry assets.	2.1 OHS and sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and established procedures.
	2.2 Tools and equipment are selected appropriate to the task requirements and are used to produce desired outcomes.
	2.3 Schedule for identifying poles and structures, and the inspection of overhead structures and electrical apparatus used on the poles is followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste, using appropriate technology.
	2.4 Essential knowledge and associated skills are applied for the safe identification of electrical apparatus to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.5 Hazard warnings and safety signs are recognised, hazards identified and OHS risks reported to immediate appropriate personnel for directions according to established procedures.
	2.6 Operational characteristics of the electrical apparatus and associated equipment are understood, with respect to the primary purpose of the apparatus and associated equipment within the supply system.
	2.7 Visual checks of the electrical apparatus and

ELEMENT	PERFORMANCE CRITERIA
	associated equipment are performed to identify defective or suspect condition
	2.8 Unplanned events during the identification of electrical apparatus and associated equipment are undertaken within the scope of established procedures.
	2.9 Known solutions to a variety of problems are applied using acquired knowledge and associated skills.
	2.10 On-going checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the identification and interpretation characteristics of electrical apparatus associated with power industry assets	3.1 Work undertaken is checked against works schedule for conformance with requirements, with anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage according to established procedures.
	3.5 Unsafe or faulty tools are identified and marked for repair in accordance with established procedures before, during and after use.
	3.6 Relevant work permit(s) are signed off and poles and structures are returned to service in accordance with requirements.
	3.7 Works completion records, reports and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of characteristics of electrical apparatus associated with power industry assets.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TEL19A Characteristics of electrical apparatus associated with power industry assets

Evidence shall show an understanding of characteristics of electrical apparatus associated with power industry assets to an extent indicated by the following aspects:

T1 Electrical apparatus safety requirements encompassing:

- Working safely with machinery and equipment near live electrical apparatus
- Selecting and using appropriate personal safety equipment
- Implementing emergency procedures for the rescue of an electric shock victim
- Providing emergency first aid for an electric shock victim
- Selecting and using Personal Protecting Equipment (PPE)

T2 Inspection of electrical apparatus encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Visual checking of poles and structures
- Identification of electrical apparatus associated with Power Industry Assets within the electrical distribution system - Single Wire Earth Return (SWER), High Voltage (HV) overhead conductors and cables, Low Voltage (LV) overhead conductors and cables, underground cables (as attached to the poles), overhead transition points and termination hardware, vibration mitigation hardware, insulators, cross arms, cross arm mountings and brackets, switches, HV fuses and fuse carriers, surge diverters, auto-reclose devices, pole mounted transformers and sub stations, possum guards, earth guards, angle of the pole, height of conductors, public lights, bolts and associated pole fixings.
- Operational knowledge of the purpose of electrical apparatus associated with Power Industry Assets within the electrical distribution system - Single Wire Earth Return (SWER), High Voltage (HV) overhead conductors and cables, Low Voltage (LV) overhead conductors and cables, underground cables (as attached to the poles), overhead transition points and termination hardware, vibration mitigation hardware, insulators, cross arms, cross arm mountings and brackets, switches, HV fuses and fuse carriers, surge diverters, auto-reclose devices, pole mounted transformers and sub stations, possum guards, earth guards, angle of the pole, height of conductors, public lights, bolts and associated pole fixings.
- Interpretation of the operational characteristics and purpose of electrical apparatus associated with Power Industry Assets

REQUIRED SKILLS AND KNOWLEDGE

- Documenting inspection findings in accordance with enterprise requirements

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to

safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of

tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Confirm operational knowledge associated with the characteristics of electrical apparatus in 8 of the following:	Single Wire Earth Return (SWER) High Voltage (HV) overhead conductors and cables Low Voltage (LV) overhead conductors and cables Underground cables (as attached to the poles) Overhead transition points and termination hardware Vibration mitigation hardware Insulators, cross arms, cross arm mountings and brackets Switches, HV fuses and fuse carriers, surge diverters, auto-reclose devices Pole mounted transformers and sub stations Possum guards, earth guards Angle of the pole Height of conductors Public Lights, bolts and associated pole fixings.
B	Confirm knowledge associated with the characteristics of at	Wood pole Steel pole

	least four of the following:	Concrete pole Composite pole Reinforced Poles
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual work near live electrical apparatus

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and

demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Electrical apparatus may include:**
 - Single Wire Earth Return (SWER), High Voltage (HV) and Low Voltage (LV) overhead conductors and cables, underground cables (as attached to the poles) and overhead transition points, conductor terminations, insulators, conductor ties, cross arms, cross arm mountings and brackets, switches, HV fuses and fuse carriers, pole mounted transformers, sub stations, air-break switches, surge diverters, auto reclose relays, possum guards, earth guards, angle of the pole, lights, bolts and associated pole fixings.
- Work permits may include:**
 - Safe Approach Distances Zones / Safe Working Clearance, Work Permit(s) and/or Access Authorisation Permits and those required under Technical standards and Industry Guidelines.
- Inspection may include:**
 - On foot or by conventional ground-based vehicle and /or from the air. Aircraft maybe helicopter or fixed wing types.
- Tools and equipment may include:**
 - Power operated tools such as chainsaws, brush cutters, power pruners, powered drills, augers, air compressors, generators, jack hammers, demolition saws, measuring devices, extendable mounted cameras
 - Excludes machinery and equipment that encompass driving and associated licenses, such as slashers, boom-operated insulated elevating work platforms, excavator, back hoes and the like.
 - Hand tools such as hacksaws, hammers, screwdrivers, sockets, wrenches, scrapers, chisels, files, tape measures, bolt cutters, knives and other related associated
- Visual checks may include:**
 - The use of un-aided eye, binoculars, X-ray, electronic data capture using infrared and/or digital video camera, computers, sonic testing devices. Items to be identified and interpreted may include overhead poles, structures and / or electrical apparatus, but not towers.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Entry Level – Cross Discipline Units.

UETTDREL20A Undertake minor vegetation control and routine minor maintenance of poles and electrical apparatus

Modification History

Release	Action	Core/Elective	Details	Points
2	Edit	N/A	Corrected "Evidence shall show that knowledge has been acquired of" statement on Required Skills and Knowledge	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers undertaking minor vegetation control and routine minor maintenance of poles and electrical apparatus.

Also included is the preparation of risk assessment control measures that encompass job safety assessment. It also includes compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for safe use of equipment near live electrical and mechanical apparatus

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Application of the Unit

Application of the Unit 2)

This competency standards unit would be applied by asset inspectors engaged in the regular and methodical inspection and treatment poles and inspection of electrical apparatus in the transmission and distribution industry sector

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures
UETTDREL14A	Working safe near live electrical apparatus as a non-electrical worker

Prerequisite Unit(s) 4)

UETTDREL17A Operate asset inspection plant, machinery and equipment near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to undertake minor vegetation control and routine minor maintenance poles and electrical apparatus.	1.1 Works instructions are received, analysed and confirmed, if necessary by site inspection.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 OHS policies and procedures related to requirements and established procedures for the conduct minor vegetation control and routine minor maintenance of poles and electrical apparatus are obtained and confirmed.
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored according to established procedures.
	1.6 Relevant work permits are obtained, where necessary, to access and perform work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
	1.8 Relevant person responsible for First Aid and / or related work safety procedures at the worksite are confirmed in accordance with established procedures to ensure safety measures are followed in the instance of an incident.
	1.9 Liaison and communication issues with appropriate personnel, clients and land owners are resolved to carry out work where necessary.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with

ELEMENT	PERFORMANCE CRITERIA
	established procedures.
	1.11 Personnel participating in the work are fully briefed and respective responsibilities confirmed in accordance with established procedures, where necessary.
	1.12 Traffic management plan is identified and road signs, barriers and warning devices are positioned in accordance with requirements, where necessary.
2 Conduct minor vegetation control and routine minor maintenance on poles and electrical apparatus.	2.1 OHS and sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and established procedures.
	2.2 Tools and equipment are selected appropriate to the task requirements and are used to produce desired outcomes.
	2.3 Lifting and use of tools and equipment, techniques and practices are safely followed in accordance with established procedures, and confirmed to eliminate the prospects of incidents.
	2.4 Essential knowledge and associated skills are applied for the safe use of selected tools and equipment for undertaking minor vegetation control, and the routine minor maintenance on poles and electrical apparatus to ensure completion in an agreed timeframe, and to quality standards with a minimum of waste according to requirements.
	2.5 Hazard warnings and safety signs are recognised, hazards identified and OHS risks reported to immediate appropriate personnel for directions according to established procedures.
	2.6 Minor vegetation control is carried out in accordance with the work schedule to requirements and established procedures in a range of geographical conditions

ELEMENT	PERFORMANCE CRITERIA
	2.7 Routine minor maintenance on poles and electrical apparatus is carried out in accordance with the work schedule to requirements and establish procedures in a range of geographical conditions.
	2.8 Unplanned events during the minor vegetation control and routine minor maintenance on poles and electrical apparatus are undertaken within the scope of established procedures.
	2.9 Known solutions to a variety of problems are applied using acquired knowledge and associated skills.
	2.10 On-going checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the minor vegetation control and routine minor maintenance on poles and electrical apparatus.	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools and equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage according to established procedures.
	3.5 Unsafe or faulty tools and equipment are identified and marked for repair in accordance with established procedures before, during and after use.
	3.6 Relevant work permit(s) are signed off and poles and structures are returned to service in accordance with requirements, where required.
	3.7 Works completion records, reports and/or documentation and information are finalised and

ELEMENT

PERFORMANCE CRITERIA

processed and appropriate personnel notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of minor maintenance of poles and electrical apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TEL20A Minor maintenance of poles and electrical apparatus

Evidence shall show an understanding of minor maintenance of poles and electrical apparatus to an extent indicated by the following aspects:

T1 Poles and electrical apparatus maintenance safety requirements encompassing:

- OHS principles
- Requirements for personal safety in the workplace and the selection of personal protective equipment
- Selecting and safety operating tools and equipment used in the conduct minor vegetation control and routine minor maintenance on poles and electrical apparatus.
- Selecting and using appropriate personal safety equipment
- Emergency first aid for an electric shock victim
- Implementing emergency procedures for the rescue of an electric shock victim
- Providing emergency first aid for an electric shock victim
- Selecting and using Personal Protecting Equipment (PPE)
- Safe use of tools and equipment
- An understanding of working safely on an around electrical equipment through the application of risk management principles and control measures.

T2 Maintenance of poles and electrical apparatus encompassing:

- Sustainability principles
- Standards, codes, legislation, supply authority regulations and enterprise policies and procedures
- An understanding tools and equipment used
- Maintenance and storage of tools and equipment used for the routine
- Maintenance and storage of tools and equipment
- Undertaking pre-operational checks of tools and equipment
- An understanding of minor vegetation control
- Undertaking minor vegetation control near live electrical apparatus
- Undertaking routine maintenance of poles and electrical apparatus
- Liaising and communicating with appropriate personnel, authorities, clients and land owners
- Completing of records, reports and documentation.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment

instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum	Item List

	number of items on which skill is to be demonstrated	
A	Confirm operational knowledge associated with the use of tools and equipment near live electrical apparatus in all of the following:	<p>Recognition of aerial voltage systems.</p> <p>Identification of Low Voltage aerial circuits.</p> <p>Identification of High Voltage aerial circuits.</p> <p>Safe approach distances so defined by relevant authorities.</p> <p>Use of regulations, codes /guidelines and established enterprise procedures.</p> <p>Vicinity Permit – information required and function.</p> <p>Environmental principals and procedures</p>
B	Confirm safe practices associated with the use of hand tools and the operation of vegetation control machinery and equipment near live electrical apparatus in all of the following:	<p>OHS safety practices and procedures.</p> <p>Electric shock and resuscitation.</p> <p>Release and rescue</p> <p>Events constituting an incident.</p> <p>Procedures in the event of/responding to, incidents.</p> <p>Methods of identifying hazards.</p> <p>Risk assessment procedures.</p> <p>Constant analysis and decision making relevant to the safety of the work, taking into</p>

		account prevailing site conditions (lay of the land) and on-going weather conditions
C	Confirm the safe use in varying geographical conditions with at least 2 of the following:	chainsaws, brush cutters, power pruners, , air compressors, generators, , demolition saws, ,
D	Confirm the safe use in varying conditions and weather all of the following:	powered drills augers Jack hammers selection of hand tools
E	Confirm pre and post operational checks, inspections and minor maintenance of the tools and equipment on at least 6 of the following:	Chainsaws, Brush cutters, Power pruners, Powered drills, Augers, Air compressors, Generators, Jack hammers, Demolition saws, Measuring devices, Extendable mounted cameras
F	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual work near live electrical apparatus

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- | | |
|---|---|
| Minor vegetation control may involve: | <ul style="list-style-type: none">clearing vegetation around the base of the pole and structures to gain access for inspection. |
| Routine minor maintenance may involve: | <ul style="list-style-type: none">the fitting and / or reattachment of labels, guards, signs and tighten of bolts and fixtures that can be accessed from the ground according to enterprise proceduresExcludes any work that is or may be performed by other competent licensed operatives. |
| Electrical apparatus may include: | <ul style="list-style-type: none">Single Wire Earth Return (SWER), High Voltage (HV) and Low Voltage (LV) overhead conductors and cables, underground cables (as attached to the poles) and overhead transition points, conductor terminations, insulators, conductor ties, cross arms, cross arm mountings and brackets, switches, HV fuses and fuse carriers, pole mounted transformers, sub stations, air-break switches, surge diverters, auto reclose relays, possum guards, earth guards, angle of the pole, lights, bolts and associated pole fixings. |
| Work permits may include: | <ul style="list-style-type: none">Safe Approach Distances Zones / Safe Working Clearance, Work Permit(s) and/or Access Authorisation Permits and those required under Technical Standards and Industry Guidelines |
| Tools and equipment may include: | <ul style="list-style-type: none">Power operated tools such as chainsaws, brush cutters, power pruners, powered drills, augers, air compressors, generators, jack hammers, demolition saws, measuring devices, extendable mounted cameras. Excludes plant and machinery that encompasses driving/flying and associated licenses, such as aerial croppers, slashers, boom-operated mowers, stump grinders, insulated elevating work platforms and the likeHand tools such as hacksaws, hammers, screwdrivers, sockets, wrenches, scrapers, chisels, files, tape measures, |

RANGE STATEMENT

- Geographical conditions may include:**
- bolt cutters, knives and other related associated
 - Rural and urban regions, fire and non-fire rated areas

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Entry Level – Cross Discipline Units.

UETTDREL21A Operate specialised data information equipment near live electrical apparatus

Modification History

Release	Action	Core/Elective	Details	Points
2	Edit	N/A	Corrected "Evidence shall show that knowledge has been acquired of" statement on Required Skills and Knowledge	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the operation of specialised data information equipment near live electrical apparatus.

Also included is the preparation of risk assessment control measures that encompass job safety assessment.

It also includes compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, industry bi-partite body – Guidelines/Codes of Practices or other related requirements for safe use of equipment near live electrical apparatus.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Application of the Unit

Application of the Unit 2)

This competency standards unit would be applied by asset inspectors engaged in the regular and methodical inspection and treatment poles and inspection of electrical apparatus in the transmission and distribution industry sector

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures
UETTDREL14A	Working safe near live electrical apparatus as a non-electrical worker

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to operate specialised data information equipment near live electrical apparatus	1.1	Works instructions are received, analysed and confirmed, if necessary by site inspection.
	1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3	OHS policies and procedures related to

ELEMENT

PERFORMANCE CRITERIA

- requirements and established procedures for the operation of specialised data information equipment near live electrical apparatus that are used on the poles are obtained and confirmed.
- 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
- 1.5 Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored according to established procedures.
- 1.6 Relevant work permits are obtained, where necessary, to access and perform work according to requirements and/or established procedures.
- 1.7 Resources including specialised data information equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.8 Relevant person responsible for First Aid and / or related work safety procedures at the worksite are confirmed in accordance with established procedures to ensure safety measures are followed in the instance of an incident.
- 1.9 Liaison and communication issues with appropriate personnel, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work are fully briefed and respective responsibilities confirmed in accordance with established procedures, where necessary.
- 1.12 Traffic management plan is identified and road signs, barriers and warning devices are positioned in accordance with requirements,

ELEMENT

PERFORMANCE CRITERIA

where necessary.

- | | | |
|---|---|--|
| | 1.13 | Pre-operational checks are undertaken to confirm safe and correct operation of specialised data information equipment for safe use near live electrical apparatus according to requirements and established procedures. |
| 2 | Operate specialised data information equipment near live electrical apparatus | |
| | 2.1 | OHS and sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and established procedures. |
| | 2.2 | Specialised data information equipment is selected appropriate to the task requirements, and used to produce desired outcome. |
| | 2.3 | Lifting and use of tools and equipment, techniques and practices are safely followed in accordance with established procedures, and confirmed to eliminate the prospects of incidents. |
| | 2.4 | Specialised data information equipment, techniques and practices are safely followed in accordance with given instructions and requirements, and confirmed to eliminate the prospects of incidents, taking into account prevailing site condition. |
| | 2.5 | Hazard warnings and safety signs are recognised, hazards identified and OHS risks reported to immediate appropriate personnel for directions according to established procedures. |
| | 2.6 | Specialised data information equipment is safely operated near live electrical apparatus in accordance with the work schedule, requirements, given instructions and established procedures. |
| | 2.7 | Non-routine events are referred to the immediate appropriate personnel for directions according to established procedures |
| | 2.8 | Problems associated with the operation of |

ELEMENT

PERFORMANCE CRITERIA

- specialised data information equipment near live electrical apparatus is attended to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met.
- 2.9 Unplanned events during the operation of specialised data information equipment near live electrical apparatus near live electrical apparatus are undertaken within the scope of established procedures.
- 2.10 Known solutions to a variety of problems are applied using acquired knowledge and associated skills.
- 2.11 On-going checks of quality of the work are undertaken in accordance with instructions and established procedures
- 3 Complete the operation of the specialised data information equipment near live electrical apparatus.
- 3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
- 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.4 Specialised data information equipment is cleaned, checked and returned to storage in accordance with established procedures
- 3.5 Post-operational checks, minor maintenance and/or relevant documentation of specialised data information equipment is conducted according to requirements.
- 3.6 Relevant work permit(s) are signed off and poles and structures are returned to service in accordance with requirements, where required.
- 3.7 Works completion records, reports and/or documentation and information are finalised and processed and appropriate personnel notified in

ELEMENT

PERFORMANCE CRITERIA

accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of specialised data information equipment near live electrical apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TEL21A Specialised data information equipment near live electrical apparatus

Evidence shall show an understanding of specialised data information equipment near live electrical apparatus to an extent indicated by the following aspects:

T1 Specialised data information equipment safety requirements encompassing:

- OHS principles
- The legal requirements covering OHS in the work place
- Requirements for personal safety in the workplace
- An understanding of working safely on an around electrical equipment through the application of risk management principles and control measures
- Identification of Hazards and risks associated with working on / near live electrical apparatus
- Recognising hazards and OHS risks
- Implementing emergency procedures for the rescue of an electric shock victim
- Providing emergency first aid for an electric shock victim
- Selecting and using Personal Protecting Equipment (PPE)

T2 Specialised data information equipment encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise policies and procedures
- Reading and following information on standard operating procedures
- Following verbal instructions
- Identifying specialised data information equipment defects
- Maintaining specialised data information equipment using appropriate techniques
- Safe use of enterprise vehicles
- Operation of specialised data information equipment - pre-operational checks, safe use of specialised data information equipment, safe transporting and storage procedures according to manufacturers' / standard operating procedures
- Completing of records, reports and documentation
- Adjustments/alignments to a range of specialised data information equipment
- Routine maintenance requirements of a range of specialised data information equipment
- Safe use of specialised data information equipment

REQUIRED SKILLS AND KNOWLEDGE

- Maintenance and storage of specialised data information equipment.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to

safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of

tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Confirm operational knowledge associated with the operation of specialised data information equipment near live electrical apparatus in all of the following:	<p>Recognition of aerial voltage systems.</p> <p>Identification of Low Voltage Aerial Circuits.</p> <p>Identification of High Voltage Aerial Circuits.</p> <p>"Safe approach distance" so defined by relevant authorities.</p> <p>Use of technical standards, acts, regulations, codes /guidelines and established/enterprise/asset owner's procedures.</p> <p>Vicinity Permit – Information required and function.</p>
B	Confirm safe practices associated with the operation specialised data information equipment near live electrical apparatus in all of the following:	<p>OHS safety practices and procedures.</p> <p>Electric shock and resuscitation.</p> <p>Events constituting an incident.</p> <p>Procedures in the event of/responding to, incidents.</p> <p>Methods of identifying hazards.</p> <p>Risk assessment procedures.</p> <p>Constant analysis and decision making relevant to the safety of</p>

		the work, taking into account prevailing site conditions (lay of the land) and on-going weather conditions
C	Confirm the safe deployment in varying conditions, and undertake pre and post operational checks, inspections and minor maintenance of specialised data information equipment in at least 3 of the following:	Infrared and/or digital video camera, Wireless camera Telescopic stick Stills digital cameras, SLR cameras, Computers / PDA, Sonic testing devices, Pneumatic height telescopic cameras Laser distance measuring equipment
D	At least one occasion	Dealing with an unplanned event by drawing on knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual work near live electrical apparatus

In addition to the resources listed above, in context of and specific

resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

Work permits may include: Safe Approach Distances Zones / Safe Working Clearance, Work Permit(s) and/or Access Authorisation Permits and those required under Technical Standards and Industry Guidelines.

Specialised data information equipment may include: Infrared and/or digital video camera, stills cameras, SLR cameras, computers, sonic testing devices, stress tester, and other related associated equipment used near live electrical apparatus

Tools may include: Power operated tools such as chainsaws, brush cutters, power pruners, powered drills, augers, air compressors, generators, jack hammers, demolition saws, measuring devices.

Excludes plant and machinery that encompasses driving/flying and associated licenses, such as aerial croppers, slashers, boom-operated mowers, stump grinders, insulated elevating work platforms and the like

Hand tools such as hacksaws, hammers, screwdrivers, sockets, wrenches, scrapers, chisels, files, tape measures, bolt cutters, knives and other related associated

Prevailing site conditions may include: Lay of the land and on-going weather conditions.

Electrical apparatus may include: Single Wire Earth Return (SWER), High Voltage (HV) and Low Voltage (LV) overhead conductors and cables, underground cables (as attached to the poles) and overhead transition points, conductor terminations, insulators, conductor ties, cross arms, cross arm mountings and brackets, switches, HV fuses and fuse carriers, pole mounted transformers, sub stations, air-break switches, surge diverters, auto reclose relays, possum guards, earth guards, angle of the pole, lights, bolts and associated pole fixings. Hand tools such as hacksaws, hammers, screwdrivers, sockets, wrenches, scrapers, chisels, files, tape

RANGE STATEMENT

measures, bolt cutters, knives and other related associated

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Entry Level – Cross Discipline Units.

UETTDRIS32A Solve electrical problems in remote community network apparatus

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Include full pre-requisite chain. Add E101 as pre req for E103	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers the underpinning skills and knowledge and the application of this skills and knowledge to provide solutions to predictable problems on remote community network apparatus. It encompasses working safely, diagnoses and problem solving procedures, including the use of voltage, current and resistance measuring devices to providing solutions derived from measurements and calculations to predictable circuit problems.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice 3)

The competency described in this unit does not directly require a license to practice but is subject to regulations for occupational health and safety and contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE103A	Solve problems in extra-low voltage single path circuits
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|---|-----|--|
| 1 | Prepare to solve electrical problems on remote community network apparatus. | 1.1 | Occupational Health and Safety procedures for a given work area are identified, obtained and understood. |
| | | 1.2 | Occupational Health and Safety risk control work preparation measures and procedures are followed. |
| | | 1.3 | The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken. |
| | | 1.4 | Advice is sought from the work supervisor to ensure the work is coordinated effectively with others. |
| | | 1.5 | Sources of materials that may be required for the work are identified and accessed in accordance with established procedures. |
| | | 1.6 | Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety. |

ELEMENT	PERFORMANCE CRITERIA
2 Solve electrical problems on remote community network apparatus.	2.1 Occupational Health and Safety risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with Occupational Health and Safety requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance Occupational Health and Safety requirements and procedures.
	2.4 Established methods are used to solve electrical problems from measured and calculated values as they apply to remote community network apparatus
	2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1 Occupational Health and Safety work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to solve circuit problems is documented.
	3.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and applying Occupational Health and Safety practices in the workplace.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS32A Remote area circuits and apparatus

Evidence shall show an understanding of remote area circuits and apparatus to an extent indicated by the following aspects:

T1 Parallel circuits encompassing:

- schematic diagram of a single-source d.c. 'parallel' circuit.
- major components of a 'parallel' circuit (power supply, loads, connecting leads and switch)
- applications where 'parallel' circuits are used in the Remote community ESI industry.
- characteristics of a 'parallel' circuit. (load connection, current paths, voltage drops, power dissipation, affects of an open circuit in a 'parallel' circuit).
- relationship between currents entering a junction and currents leaving a junction
- calculation of the total resistance of a 'parallel' circuit.
- calculation of the total current of a 'parallel' circuit.
- Calculation of the total voltage of a 'parallel' circuit.
- setting up and connecting a single-source d.c. parallel circuit
- resistance, voltage and current measurements in a single-source parallel circuit
- voltage, current, resistance or power dissipated from measured values of any of these quantities

T2 Series/parallel circuits encompassing:

- schematic diagram of a single-source d.c. 'series/parallel' circuit.
- major components of a 'series/parallel' circuit (power supply, loads, connecting leads and switch)
- applications where 'series/parallel' circuits are used in the Remote community ESI industry.
- characteristics of a 'series/parallel' circuit. (load connection, current paths, voltage drops, power dissipation, affects of an open circuit in a 'series/parallel' circuit).
- calculation of the total resistance of a 'series/parallel' circuit.
- calculation of the total current of a 'series/parallel' circuit.
- calculation of the total voltage and the individual voltage drops of a 'series/parallel' circuit.
- setting up and connecting a single-source d.c. series/ parallel circuit

REQUIRED SKILLS AND KNOWLEDGE

- resistance, voltage and current measurements in a single-source d.c. series / parallel circuit
- voltage, current, resistances or power dissipated from measured values of any two of these quantities

T3 Factors affecting resistance encompassing:

- four factors that affect the resistance of a conductor (type of material, length, cross-sectional area and temperature)
- affect the change in the type of material (resistivity) has on the resistance of a conductor.
- affect the change in 'length' has on the resistance of a conductor.
- affect the change in 'cross-sectional area' has on the resistance of a conductor.
- effects of temperature change on the resistance of various conducting materials
- effects of resistance on the current-carrying capacity and voltage drop in cables.
- using digital and analogue ohmmeter to measure the change in resistance of different types of conductive materials (copper, aluminium,) when those materials undergo a change in type of material length, cross-sectional area and temperature.

T4 Effects of meters in a circuit encompassing:

- selecting an appropriate meter in terms of units to be measured, range, loading effect, accuracy and safety category of meters for a given application.
- instruments used in the field to measure voltage and current, the typical circumstances in which they are used.
- hazards involved in using electrical instruments and the safety control measures that should be taken.
- operating characteristics of analogue and digital meters.
- correct techniques to read the scale of an analogue meters and how to reduce the 'parallax' error.
- types of voltmeters used in the ESI industry – bench type, clamp meter, Multimeter, etc.
- purpose and characteristics (internal resistance, range, loading effect and accuracy) of a voltmeter.
- types of voltage indicator testers. e.g. LED, neon, solenoid, volt-stick, series tester, etc. and explain the purpose of each voltage indicator tester.
- operation of various voltage indicator testers.
- Explain the advantages and disadvantages of each voltage indicator tester.
- List the various types of ammeters used in the ESI industry – bench, clamp meter, multimeter, etc.
- Explain the purpose of an ammeter and the correct connection (series) of an ammeter into a circuit.
- Explain the reasons why the internal resistance of an ammeter must be extremely low and the dangers and consequences of connecting an ammeter in parallel and/or wrong polarity.
- Connect an analogue/digital voltmeter into a circuit ensuring the polarities are

REQUIRED SKILLS AND KNOWLEDGE

correct and take various voltage readings.

- Demonstrate the loading effect of various voltmeters when measuring voltage across various loads.
- Use a variety of voltage indicator testers to detect the presence of various voltage levels.
- Connect an analogue/digital ammeter into a circuit ensuring the polarities are correct and take various current readings.
- steps and procedures for the safe use, care and storage of electrical instruments.

T5 Resistance Measurement encompassing:

- Identification of instruments used in the field to measure resistance (including insulation resistance) and the typical circumstances in which they are used.
- the purpose of an Insulation Resistance (IR) Tester.
- the parts and functions of various analogue and digital IR Tester (selector range switch, zero ohms adjustment, battery check function, scale and connecting leads).
- reasons why the supply must be isolated prior to using the IR tester.
- where and why the continuity test would be used in an ESI systems.
- where and why the insulation resistance test would be used in an ESI system.
- the voltage ranges of an IR tester and where each range may be used. e.g. 250 V d.c, 500 V d.c & 1000 V d.c
- the AS/NZS3000 Wiring Rules requirements – continuity test and insulation resistance test.
- the purpose of regular IR tester calibration.
- the correct methods of storing the IR tester after use
- carry out a calibration check on a IR Tester
- measurement of low values of resistance using an IR tester continuity functions.
- measurement of high values of resistance using an IR tester insulation resistance function.
- the volt-ammeter (short shunt and long shunt) methods of measuring resistance.
- calculation of resistance values using voltmeter and ammeter reading (long and short shunt connections)
- measurement of resistance using volt-ammeter methods

T6 Capacitors and Capacitance encompassing:

- basic construction of standard capacitor, highlighting the: plates, dielectric and connecting leads
- different types of dielectric material and each dielectric's relative permittivity.
- identification of various types of capacitors commonly used in the ESI industry (Fixed value capacitors -Stacked plate, Rolled, Electrolytic, Ceramic, Mica and Variable value capacitors – tuning and trimmer)
- circuit symbol of various types of capacitors: standard; variable, trimmer and polarised
- terms: Capacitance (C), Electric charge (Q) and Energy (W)

REQUIRED SKILLS AND KNOWLEDGE

- unit of: Capacitance (Farad), Electric charge (Coulomb) and Energy (Joule)
- factors affecting capacitance (the effective area of the plates, the distance between the plates and the type of dielectric) and explain how these factors are present in all circuits to some extent.
- how a capacitor is charged in a d.c. circuit.
- behaviour of a series d.c. circuit containing resistance and capacitance components. - charge and discharge curves
- the term 'Time Constant' and its relationship to the charging and discharging of a capacitor.
- calculation of quantities from given information: Capacitance ($Q = VC$); Energy ($W = \frac{1}{2}CV^2$); Voltage ($V = Q/C$)
- connection of a series d.c. circuit containing capacitance and resistor to determine the time constant of the circuit

T7 Handling and testing capacitors encompassing:

- hazards involved in working with capacitance effects and the safety control measures that should be taken.
- safe handling and the correct methods of discharging various size capacitors
- dangers of a charged capacitor and the consequences of discharging a capacitor through a person
- effects of capacitors connected in parallel.
- effects on the total capacitance of capacitors connected in series.
- common faults in capacitors.
- testing of capacitors to determine serviceability.
- application of capacitors in the ESI industry.

T8 Magnetism encompassing:

- magnetic field pattern of bar and horse-shoe magnets.
- magnets attraction and repulsion when brought in contact with each other.
- common magnetic and non-magnetic materials and groupings (diamagnetic, paramagnetic and ferromagnetic materials).
- principle of magnetic screening (shielding) and its applications.
- practical applications of magnets

T9 Electromagnetism encompassing:

- conventions representing direction of current flow in a conductor.
- magnetic field pattern around a single conductor and two adjacent conductors carrying current.
- Using the "right hand rule" to determine the direction of magnetic field around a current carrying conductor.
- direction of force between adjacent current carrying conductors.
- effect of current, length and distance apart on the force between conductors (including forces on bus bars during fault conditions).

REQUIRED SKILLS AND KNOWLEDGE

- magnetic field around an electromagnet.
- Using the “right hand rule” to determine the direction of magnetic field around a current carrying coil.
- magnetomotive force (m.m.f.) and its relationship to the number of turns in a coil and the current flowing in the coil.
- practical applications of electromagnets.

T10 Electromagnetic induction encompassing:

- principle of electromagnetic induction (Faraday’s law of electromagnetic induction).
- applying “Fleming’s right hand rule” to a current a carrying conductor under the influence of a magnetic field.
- calculation of induced e.m.f. in a conductor given the conductor length, flux density and velocity of the conductor.
- calculation of induced e.m.f. in a coil given the number of turns in a coil and the rate of change of flux.
- calculation of force on a conductor given the flux density of the magnetic field, length of the conductor and the current being carried by the conductor.
- Lenz’s law
- applications of electromagnetic induction

T11 Inductance encompassing:

- construction of an inductor, including a bifilar winding inductor.
- Australian Standard circuit diagram symbol for the four types of inductor.
- effect of physical parameters on the inductance of an inductor.
- common types of inductor cores.
- applications of the different types of inductors.
- definition of terms self induction, inductance and mutual inductance.
- calculation of value of self induced e.m.f. in a coil.
- mutual induction occurs between two coils.
- practical applications for the effects of self and mutual induction.
- undesirable effects of self and mutual induction.

T12 Magnetic devices encompassing:

- construction, operation and applications of relays.
- construction, operation and applications of contactors.
- magnetic methods used to extinguish the arc between opening contacts.
- construction, operation and applications of Hall Effect devices.
- construction, operation and application of magnetic sensing devices.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET09”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range;
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range;
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment;
 - Demonstrate an appropriate level of employability skills; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Apply Occupational Health and Safety practices in the workplace as described in 8) and including:
 - Applying work procedures and instructions as they apply to risk control measures
- A Participation in consultation processes, identifying hazards and implementing and

monitoring control measures.

B Applying work procedures and instructions as they apply to risk control measures.

- Preparing to enter the workplace including, the use of work permits and clearances and isolation permissions.
- Show evidence that all aspects of the range statement are demonstrated on two occasions
- Dealing with accidents and emergencies within the scope of responsibility.
- Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Ability to implement these Occupation Health and Safety measures shall be demonstrated on all occasions safety issues arise.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- Occupational Health and Safety policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation of poles and or structures and their associated hardware.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

This unit shall be assessed concurrently, as it relates to other units undertaken in a possible skill clusters or qualification.

Components of this unit are included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving electrical problems in remote community network apparatus:

- (a) Relevant Occupational Health and Safety legislation, regulations and codes of practice related to hazards present in remote communities are followed.
- (b) Accepted industry workplace procedures and instructions for remote communities are followed.
- (c) Determine the correct operation of remote community network apparatus.
- (d) Diagnose and provide solutions as they apply to remote community network apparatus.

Predictable problems within remote community network apparatus may include the following:

- (a) Hi/Low volts
- (b) High resistance
- (c) Low resistance
- (d) Fault Current (Fuses)
- (e) Kilowatt hour meter faults (No supply, reverse polarity, etc)
- (f) Streetlight faults

In relation to the following remote community electrical problems on at least two occasions:

- (a) Using voltage, current and resistance measuring devices.
- (b) Providing solutions derived from measurements and calculations to electrical problem in remote communities.
- (c) Altering an existing circuit to comply with specified operating parameters.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Industry Specific Cross-Discipline Units

UETTDRIS33A Solve electrical problems in remote community network systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers the underpinning skills and knowledge and the application of this skills and knowledge to provide solutions to predictable problems on remote community network systems. It encompasses working safely, diagnoses and problem solving procedures, including the use of voltage, current and resistance measuring devices to providing solutions derived from measurements and calculations to predictable circuit/systems problems.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice 3)

The competency described in this unit does not directly require a license to practice but is subject to regulations for occupational health and safety and contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE103A	Solve problems in extra-low voltage single path circuits
UETTDRIS32A	Solve electrical problems in remote community network apparatus
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability

Employability Skills

5)

Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Prepare to solve electrical problems on remote community network systems.	1.1	Occupational Health and Safety procedures for a given work area are identified, obtained and understood.
		1.2	Occupational Health and Safety risk control work preparation measures and procedures are followed.
		1.3	The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
		1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
		1.5	Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.
		1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

ELEMENT	PERFORMANCE CRITERIA
2 Solve electrical problems on remote community network systems.	2.1 Occupational Health and Safety risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with Occupational Health and Safety requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance Occupational Health and Safety requirements and procedures.
	2.4 Established methods are used to solve electrical system problems from measured and calculated values as they apply to remote community network systems
	2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6 Problems are solved without damage to apparatus, circuits, and systems, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1 Occupational Health and Safety work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to solve circuit problems is documented.
	3.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and applying Occupational Health and Safety practices in the workplace.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS33A Remote area network systems

Evidence shall show an understanding of remote area network systems to an extent indicated by the following aspects:

T1 Alternating Current Quantities encompassing:

- sine, cosine and tangent ratios of a right angle triangle
- Pythagoras Theorem to a right angle triangle.
- use of the CRO to measure d.c. and a.c. voltage levels
- sinusoidal voltage generated by a single turn coil rotated in a uniform magnetic fields
- terms 'period', 'maximum value', 'peak-to-peak value', 'instantaneous value', 'average value', 'root-mean-square (r.m.s.) value', in relation to a sinusoidal waveform.
- calculation of the instantaneous value of induced voltage of a generated sinusoidal waveform.
- measurement of instantaneous, peak, peak-to-peak values and the period of a sinusoidal waveform.
- calculation of root-mean-square (r.m.s.) value and frequency of a sinusoidal waveform from values of peak voltage and period.

T2 Phasors Diagrams encompassing:

- purpose of phasor diagrams
- 'in-phase', 'out-of-phase', 'phase angle" lead' and 'lag'.
- phase angle between two or more alternating quantities from a given sinusoidal waveform diagram.
- convention for representing voltage, current and the reference quantity in a phasor diagram.
- drawing phasor diagrams to show the relationship between two or more a.c. values of voltage and/or current.
- determination of phase relationship between two or more sinusoidal waveforms from a given diagram and measurements..

T3 Single Element a.c. circuits encompassing:

- setting up and connect a single-source resistive a.c. circuit and take voltage and current measurements to determine the resistance

REQUIRED SKILLS AND KNOWLEDGE

- determining the voltage, current resistances from measure of given values of any two of these quantities.
- relationship between voltage drops and current in resistive a.c. circuit
- applications of resistive a.c. circuits
- defining 'inductive reactance'.
- calculation of inductive reactance for a given inductor and the relationship between inductive reactance and frequency.
- applying Ohm's Law to determine voltage, current of inductive reactance in a purely inductive a.c. circuit given any two to these quantities.
- applications of inductive a.c circuits.
- calculation of capacitive reactance
- applying Ohm's Law to determine voltage, current or capacitive reactance in a purely capacitive a.c circuit given any two of the quantities.
- applications of capacitive a.c circuits

T4 Impedance a.c. circuits encompassing:

- impedance' and impedance triangle.
- determining the impedance, current and voltages for a series a.c circuit.
- drawing and labelling the impedance triangle for a series RC circuit
- examples of capacitive components in power circuits and systems and the effect on the phase relationship between voltage and current.
- drawing the equivalent circuit of a practical inductor
- examples of inductive components in power circuits and systems and describe their effect on the phase relationship between voltage and current

T5 Power in an a.c. circuit encompassing:

- difference between true power, apparent power and reactive power and the units in which these quantities are measured.
- drawing the power triangle to show the relationships between true power, apparent power and reactive power
- defining the term "power factor" and phase angle.
- methods used to measure single phase power, energy and demand.

T6 Power Factor Improvement encompassing:

- effects of low power factor.
- requirements for power factor improvement.
- methods used to improve low power factor of a installation.
- local supply authority and AS/NZS 3000 wiring rules requirements regarding the power factor of an installation and power factor improvement equipment.

T7 Harmonics Effect in a.c. Systems encompassing:

- term "harmonic" in relation to the sinusoidal waveform of an a.c. power system.
- sources in a.c. systems that produce harmonics.
- problems that may arise in a.c. circuits as a result of harmonics and how these are

REQUIRED SKILLS AND KNOWLEDGE

overcome.

- methods and test equipment used to test for harmonics
- methods used to reduce harmonics in a.c. power system

T8 Three Phase Systems encompassing:

- features of a multiphase system.
- comparison of voltages generated by single and multiphase alternators.
- reasons for the adoption of three phases for power systems.
- how three phases is generated in a single alternator.
- Calculation of r.m.s. value of voltage generated in each phase given the maximum value.
- relationship between the phase voltages generated in a three phase alternator and the conventions for identifying each.
- term "phase sequence" (also, referred to as "phase rotation").
- determining the phase sequence of a three phase supply

T9 Three phase star-connections encompassing:

- connecting a three phase star-connection load.
- phase relationship between line and phase voltages and line and phase currents of a star-connected system.
- determining the r.m.s. value of line and phase voltage given any one of these quantities.
- determining the r.m.s. value of line and phase current given any one of these quantities.
- terms "balanced load" and "unbalanced load".
- example of balanced and unbalanced loads in typical power systems.

T10 Three phase four wire systems encompassing:

- purpose of the neutral conductor in a three phase four wire systems.
- determining the effects of an high impedance in the neutral conductor of a three phase four wire system supplying an unbalanced load where MEN earthing is employed.

T11 Three phase delta-connections and Interconnected systems encompassing:

- connecting three phase delta loads.
- phase relationship between line and phase voltages and line and phase currents of a delta-connected system.
- determining the r.m.s. value of line and phase voltage given any one of these quantities.
- determining the r.m.s. value of line and phase current given any one of these quantities.
- limitations and uses of open delta connections
- example of loads in typical power systems.
- drawing the typical combinations of three phase interconnected systems using

REQUIRED SKILLS AND KNOWLEDGE

star-connections and a delta-connection.

- relationship between line and phase voltages and line and phase currents in the typical interconnected systems using star-connections and delta-connections.

T12 Fault Loop Impedance encompassing:

- term fault loop impedance of a a.c. power system
- measuring fault loop impedance of typical circuits
- procedures for testing fault loop impedance

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET09". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range;
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range;
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment;
 - Demonstrate an appropriate level of employability skills;

and

- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Apply Occupational Health and Safety practices in the workplace as described in 8) and including:
 - Applying work procedures and instructions as they apply to risk control measures
- A Participation in consultation processes, identifying hazards and implementing and monitoring control measures.
- B Applying work procedures and instructions as they apply to risk control measures.
- Preparing to enter the workplace including, the use of work permits and clearances and isolation permissions.
 - Show evidence that all aspects of the range statement are demonstrated on two occasions
 - Dealing with accidents and emergencies within the scope of responsibility.
 - Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Ability to implement these Occupation Health and Safety measures shall be demonstrated on all occasions safety issues arise.

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- Occupational Health and Safety policy and work procedures and instructions.

- Suitable work environment, facilities, equipment and materials to undertake actual installation of poles and or structures and their associated hardware.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

This unit shall be assessed concurrently, as it relates to other units undertaken in a possible skill clusters or qualification.

Components of this unit are included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving electrical problems in remote community network apparatus:

- (a) Relevant Occupational Health and Safety legislation, regulations and codes of practice related to hazards present in remote communities are followed.
- (b) Accepted industry workplace procedures and instructions for remote communities are followed.
- (c) Determine the correct operation of remote community network systems.
- (d) Diagnose and provide solutions as they apply to remote community network systems.

Predictable problems within remote community network systems may include the following:

- (a) Hi/Low volts
- (b) Phase-in-balance
- (c) High resistance
- (d) MEN faults (High resistivity earth electrodes, Spurious voltages)
- (e) Fault Current (Fuses)
- (f) Kilowatt hour meter faults (No supply, reverse polarity, etc)
- (g) Streetlight faults

In relation to the following remote community electrical problems on at least two occasions:

- (a) Using voltage, current and resistance measuring devices.
- (b) Providing solutions derived from measurements and calculations to electrical problem in remote communities.
- (c) Altering an existing circuit to comply with specified operating parameters.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Industry Specific Cross-Discipline Units

UETTDRIS34A Install and replace energy meters and associated equipment in remote communities

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and replacement of whole current energy meters and associated equipment in remote communities, where replacement may include the identification of faults in accordance with established procedures and return to service. It includes the requirements to ascertain if normal functions of the meters and associated equipment are in accordance with established procedures.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEK101A	Maintain safety and tidiness of remote area power supply systems
UEENEEK102A	Work safely with remote area power supply systems

Prerequisite Unit(s) 4)

UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the installation and replacement of energy meters and associated equipment	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 OHS policies and procedures related to requirements and established procedures for the installation and replacement of energy meters and associated equipment are obtained and confirmed for the purposes of the work to be performed and communicated.
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
	1.6 Resources including personnel, equipment, tools and personnel protective equipment required for the job are obtained and confirmed in working order.
	1.7 Relevant personnel at worksite are confirmed current in First Aid, Rescue and other related work procedures according to requirements.
	1.8 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.9 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA
	1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.11 Road signs, barriers and warning devices are positioned in accordance with requirements.
2 Carry out the installation and replacement of energy meters and associated equipment	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Essential knowledge and associated skills are applied in the safe installation and replacement of energy meters and associated equipment to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.4 Installation and/or replacement of energy meters and associated equipment is carried out, including, as required, wiring, testing, programming and sealing and of meter(s) and associated equipment in accordance with requirements and enterprise requirements.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6 Unplanned events during the installation and replacement of energy meters and associated equipment are undertaken within the scope of established procedures.
	2.7 Known solutions to a variety of problems are applied using acquired essential knowledge and

ELEMENT	PERFORMANCE CRITERIA
3 Complete the installation and replacement of energy meters and associated equipment	<p>associated skills.</p> <p>2.8 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.</p> <p>3.1 Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.</p> <p>3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.</p> <p>3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.</p> <p>3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.5 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and replacing energy meters and associated equipment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS34A Remote area energy metering

Evidence shall show an understanding of the installation and replacement of whole current energy meters and associated equipment in remote communities to an extent indicated by the following aspects:

- T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and replacement of energy meters and associated equipment.
- T2 Construction, operation and selection of whole current energy meters (Single, polyphase, pre-payment, demand, induction, electronic)
- T3 Construction, operation and selection of associated equipment. (Service Protection Device (HRC, Circuit Breaker), Meter boards, Main Switch, Meter enclosure, service links)
- T4 Metering Arrangements (Direct metering, Distributed master metering, Multiple master metering, Plug-in metering, MEN system, typical cable routes through buildings)
- T5 Cable types and applications (cable construction, sizes and ratings, requirements for protection and supporting cables)
- T6 Installation tools and equipment required
- T7 Installation and removal of energy meters (Stripping cable correctly, need for sound terminations, wiring meter position correctly, fitting SPD, fitting meter boards, fitting meters)
- T8 Testing procedures (continuity testing, insulation testing, polarity testing, phase sequence testing, neutral integrity testing and meter functionality testing)
- T9 Completing energy meter documentation
- T10 Customer education on energy meters
- T11 Techniques for the maintenance of energy metering (Fault finding, fault rectification, meter reading, tariff changes)

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Any one of the following:	Induction disk energy meter Electronic energy meters Maximum demand meters Electronic summators
B	At least one of the following:	Service fuses Service links Meter boards Meter panels
C	At least one of the following:	Time switches Frequency injection relays Controlled output meters Contactors
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to undertake actual installation and replacement of energy meters and associated equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and replacement of whole current energy meters and associated equipment, where replacement may include the identification of faults and the return to service.

Installation may include single and polyphase meters and associated equipment.

Replacement may include the removal and return to service of “like for like” energy meters and associated equipment in a variety of environments and contexts.

Associated equipment includes load control devices such as time switches and audio frequency injection relays, plug in meter bases, service fuses and links, contactors and meter boards and panels where the installation uses direct-wired (non-current transformer) metering.

Meters include induction disc energy meters, electronic energy meters, maximum demand meters, electronic summators, time switches and relays, provided that they are basic direct-wired instruments. Current transformer metering is not included.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards

RANGE STATEMENT

- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Industry Specific Cross-Discipline Units

UETTDRIS35A Perform remote community network field switching to a given schedule

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the conducting of low voltage network field switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule and in accordance with enterprise procedures. It covers low voltage distribution systems in remote community situations but also includes paralleling in accordance with the switching schedule. It also encompasses the procedure of; communicating with the Switching Control Officer or Electrical Control Officer, isolating the electrical equipment and the line or work site, as well as proving that the area is de-energised and earthed, issuing/accepting electrical permits and the returning of the affected circuits to service.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may

License to practice

3)

require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work

Prerequisite Unit(s) 4)

UEENEEK101A	Maintain safety and tidiness of remote area power supply systems
UEENEEK102A	Work safely with remote area power supply systems
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the LV field switching to a given schedule	<p>1.1 Switching and work schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for LV switching are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant authority is obtained to perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p> <p>1.8 Relevant personnel at worksite are confirmed current in First Aid and other related work procedures according to requirements.</p> <p>1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.</p> <p>1.10 Site is prepared according to the work schedule and to minimise risk and damage to property,</p>

ELEMENT

PERFORMANCE CRITERIA

- commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.
- 2 Carry out LV field switching to a given schedule
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
- 2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Essential knowledge and associated skills in the safe LV field switching to a given schedule are applied to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.4 Communications with Switching Control Officer are established and maintained throughout the isolation operation according to established procedures.
- 2.5 Electrical equipment and associated circuits line/network or work site to be switched including paralleling is isolated and proved de-energised using appropriate devices and earthed where required according to requirements and established procedures.
- 2.6 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.7 Unplanned events occurring during LV field

ELEMENT

PERFORMANCE CRITERIA

- switching to a given schedule are responded to and undertaken within the scope of established procedures.
- 2.8 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.9 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
- 3 Complete the LV field switching to a given schedule
- 3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
- 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant permit(s) are signed off, safety devices are removed, and the system is re-energised and returned to service in accordance with requirements/established procedures.
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel and authority notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of performing high voltage field switching to a given schedule.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01 –TIS35A Remote community network field switching

Evidence shall show an understanding of the remote community network field switching to an extent indicated by the following aspects:

T1 Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching

T2 Requirements for the use of manuals, system diagrams/plans and drawings encompassing:

- Types, characteristics and capabilities of electrical apparatus
- Use, characteristics and capabilities of specialised tools and testing equipment
- LV network interconnectors for alternate sources of supply and possible backfeed.
- HV network interconnectors source of possible backfeed

T3 Procedures for obtaining correct LV switching authorisation encompassing:

- Identification of hazards, assessing and controlling risks
- Safety procedures and precautions
- Safe approach distances
- Responsibilities and protocols
- Identifying switching resources
- Procedures for obtaining electrical access permits/authorities
- Requirements for team switching
- Procedures for coordination of operations

T4 Techniques in LV system switching encompassing:

- Isolation procedures and proving dead
- Pre-switching checks
- Switching operational procedures
- Emergency fault procedures
- Energisation procedures

T5 Role of the HV switching operator

T6 Procedures for obtaining correct HV switching authorisation encompassing:

- Identification of OHS hazards, assessing and controlling risks
- Safety procedures and precautions

REQUIRED SKILLS AND KNOWLEDGE

- Safe approach distances
- Responsibilities and protocols
- Identifying switching resources
- Procedures for obtaining electrical access permits/authorities
- Requirements for team switching
- Procedures for coordination of operations

T7 Use and operation of equipment associated with HV overhead and substation equipment encompassing:

- Test instruments
- Sticks
- Interrupters
- Arc stragglers

T8 Operation of protection systems and substation equipment

- Note: Examples include fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications

T9 Types and categories of HV switchgear

T10 Application, function and operating capabilities of switchgear

T11 Restrictions pertaining to HV switching equipment

T12 Procedures for the isolation of HV transmission main and working earths

T13 Earthing HV electrical apparatus practices and procedures for access encompassing:

- Purposes of Operational and additional work part - on-site earths
- Factors determining the location and effectiveness of Operational earthing
- Acceptable industry procedures
- Personal protective equipment

T14 High voltage switching techniques

- Pre-switching checks
- Switching operational procedures
- Isolation procedures and proving dead/de-energised
- Earthing procedures
- Pre-switching checks
- Switching operational procedures
- Emergency fault procedures
- Energisation procedures

T15 Application and function of SWER system components

- Circuit arrangement

REQUIRED SKILLS AND KNOWLEDGE

- Principle of operation
- Hazards and procedures associated with faulty SWER earth systems
- Procedure to isolate, energise and commission SWER substations

T16 Operation of HV overhead switching or indicating devices encompassing:

- Identifying hazards, assessing and controlling risks associated with HV switchgear operation
- Systematic and defensive techniques
- Mobile radio procedures
- Double isolation procedures
- fuses; disconnect fuses; load switching; live line indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing sticks; phasing tester.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	Approvals/clearances Access authority /permits
B	Any two of the following:	Voltage detectors Polarity testers Phase rotation indicators
C	Any one of the following:	LV links LV bridges LV fuses
D	At least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual performance of LV field switching to a given schedule.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the conducting of low voltage switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule as it relates to low voltage distribution systems in field situations but also includes paralleling in accordance with the switching schedule.

Operation of circuit isolation devices associated with energy reticulation systems/networks is confined to low voltage systems in field situations which are performed in accordance with a switching schedule and established procedures.

Switching Control Officer refers to an appropriate person designated as such by regulations, codes or enterprise arrangements who is responsible for coordinating and directing switching activities in consultation with field operatives.

Switchgear may include Low Voltage fuses, Low Voltage links and bridges.

Specialist tools and devices may include Low Voltage detectors, Low Voltage polarity testers and Low Voltage phase rotation indicators.

Switching program/schedule refers to structure, switch or equipment number; locations; Low Voltage distributor, spur or feeder; outage times; works order/plan

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards

RANGE STATEMENT

- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS36A Install and maintain low voltage services in remote communities (overhead)

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation, maintenance and connection of low voltage overhead service lines and associated equipment (between the connection point and the point of supply - customers' premises) in remote communities. Maintenance includes the repair and replacement of service cables, service fuses and the replacement and repair of service hardware, the identification and rectification of faults. It also covers insulation, voltage, polarity testing and phase rotation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice

3)

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE103A	Solve problems in extra-low voltage, single path circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEK101A	Maintain safety and tidiness of

Prerequisite Unit(s)	4)	remote area power supply systems
	UEENEEK102A	Work safely with remote area power supply systems
	UEENEEK116A	Maintain and repair remote area power generation facilities
	UEENEEK120A	Maintain operation remote area power plant
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDNIS32A	Solve electrical problems in remote community network apparatus
	UETTDNIS33A	Solve electrical problems in remote community network systems
	UETTDNIS99A	Test and Verify Distribution Remote Area Installations

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged

Employability Skills

5)

will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|---|--|
| 1 Prepare for the installation and maintenance of LV overhead services and associated equipment | 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection. |
| | 1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites. |
| | 1.3 OHS policies and procedures related to requirements and established procedures for the installation and maintenance of LV overhead services and associated equipment are obtained and confirmed for the purposes of the work to be performed and communicated. |
| | 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures. |
| | 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures. |
| | 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or |

ELEMENT

PERFORMANCE CRITERIA

- established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.
- 2 Carry out installation and maintenance of LV overhead services and associated equipment
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
- 2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Essential knowledge and associated skills are applied in the safe installation and maintenance of LV overhead services and associated equipment to ensure completion to quality standards with a minimum of waste according to requirements.

ELEMENT

PERFORMANCE CRITERIA

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|-----|---|
| 2.4 | LV overhead services and associated equipment are installed according to the work schedule and requirements/established procedures. |
| 2.5 | Maintenance, including repair and/or replacement of LV overhead services and associated equipment is carried out, in accordance with the work schedule and requirements/established procedures. |
| 2.6 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| 2.7 | Unplanned events during the installation and maintenance of LV services and associated equipment are undertaken within the scope of established procedures. |
| 2.8 | Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills. |
| 2.9 | Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures. |
| 3 | Complete the installation and maintenance of LV overhead services and associated equipment |
| 3.1 | Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures. |
| 3.2 | Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable. |
| 3.3 | Work site is rehabilitated, cleaned up and made safe in accordance with established procedures. |
| 3.4 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
| 3.5 | Relevant work permit(s) are signed off and, the LV overhead services and associated equipment |

ELEMENT

PERFORMANCE CRITERIA

are returned to service in accordance with requirements.

- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining low voltage services (overhead).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS36A Remote area overhead LV services

Evidence shall show an understanding of the installation, maintenance and connection of low voltage overhead service lines and associated equipment (between the connection point and the point of supply to the customers' premises) in remote areas to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation, maintenance and connection of low voltage overhead service lines and associated equipment.

T2 Types, sizes and characteristics of low voltage overhead services (Two-core, Three-core, Four-core, Cable cross-sectional area of conductors, current ratings, cable insulation materials)

T3 Types and characteristics of low voltage service associated equipment (Connectors, IPC's, service termination devices, Fuses holders, fuses, service poles, point-of-attachment brackets, mains connection boxes)

T4 Requirements prior to the installation of overhead service (Service documentation, minimum clearances to assets and ground, location of attachments, relevant electrical access permit, maximum span lengths and service cable tension, MEN system,)

T5 Types of installation plant, equipment and tools (Elevated work platform, ladders, service cable puller and tension tool, stripping tool, ABC spanner, ABC spreader, spanners, screwdrivers etc)

T6 Installation techniques (Methods of stringing, tensioning and terminating, effect of poor connections)

T7 Testing and commissioning overhead services (continuity testing, insulation testing, polarity testing, phase sequencing, neutral integrity testing)

T8 Completing Enterprise documentation

T9 Techniques for the maintenance of overhead services (Inspection, Types of faults, Diagnosis and repair of faults, removing and replacing services and fuses)

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least two of the following:	Overhead service line (three phase)* Overhead service line (single phase) Overhead service line (two phase) (* must do)
B	At least one of the following:	Service fuse Circuit breakers (pole) Service link
C	All of the following:	Polarity test * Phase rotation test Continuity test Voltage test (* must do)
D	At least one of the following:	Aluminium LV mains Copper LV mains LV ABC mains
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a

workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of overhead LV services.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of overhead low voltage services as they relate to distribution circuits and associated equipment and includes the identification of faults.

Installation may include, the erection and connection of service lines, the fitting and connection of pole fuses or circuit breakers and the testing and commissioning of the service.

Maintenance may include the identification and diagnosis of faults, the removal, replacement or repair of service lines and associated hardware and the temporary installation of services and associated equipment and the testing and commissioning of the service.

Testing procedures may include continuity, polarity, phase rotation, insulation resistance and voltage.

Testing equipment may include, digital/analogue voltage testers, multimeters, phase rotation testers, load testers, insulation resistance and continuity testers.

Associated hardware may include pole fuse units, circuit breakers, contactors, mains connection boxes.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures

RANGE STATEMENT

- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS37A Install and maintain low voltage services in remote communities (underground)

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation, maintenance and connection of low voltage underground service lines and associated equipment (between the connection point and the point of supply - customers' premises). Maintenance includes the repair and replacement of service cables, service fuses and the replacement and repair of service hardware, the identification and rectification of faults. It also covers insulation, voltage, polarity testing and phase rotation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice

3)

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE103A	Solve problems in extra-low voltage, single path circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEK101A	Maintain safety and tidiness of

Prerequisite Unit(s) 4)

remote area power supply systems

UEENEEK102A Work safely with remote area power supply systems

UEENEEK116A Maintain and repair remote area power generation facilities

UEENEEK120A Maintain operation remote area power plant

UETTDREL11A Apply sustainable energy and environmental procedures

UETTDREL16A Working safely near live electrical apparatus

UETTDNIS32A Solve electrical problems in remote community network apparatus

UETTDNIS33A Solve electrical problems in remote community network systems

UETTDNIS99A Test and Verify Distribution Remote Area Installations

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged

Employability Skills

5)

will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|--|---|
| 1 Prepare for the installation and maintenance of LV underground services and associated equipment | 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection. |
| | 1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites. |
| | 1.3 OHS policies and procedures related to requirements and established procedures for the installation and maintenance of LV underground services and associated equipment are obtained and confirmed for the purposes of the work to be performed and communicated. |
| | 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures. |
| | 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures. |
| | 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or |

ELEMENT

PERFORMANCE CRITERIA

- established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
 - 1.8 Relevant personnel at worksite are confirmed current in First Aid, Rescue and other related work procedures according to requirements.
 - 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
 - 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
 - 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
 - 1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.
- 2 Carry out installation and maintenance of LV underground services and associated equipment
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
 - 2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
 - 2.3 Essential knowledge and associated skills are applied in the safe installation and maintenance of LV underground services and associated equipment to ensure completion to quality standards with a minimum of waste according to requirements.

ELEMENT

PERFORMANCE CRITERIA

- | | |
|-----|---|
| 2.4 | LV underground services and associated equipment are installed according to the work schedule and requirements/established procedures. |
| 2.5 | Maintenance, including repair and/or replacement of LV services and associated equipment is carried out, in accordance with the work schedule and requirements/established procedures. |
| 2.6 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| 2.7 | Unplanned events during the installation and maintenance of LV services and associated equipment are undertaken within the scope of established procedures. |
| 2.8 | Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills. |
| 2.9 | Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures. |
| 3 | Complete the installation and maintenance of LV underground services and associated equipment |
| 3.1 | Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures. |
| 3.2 | Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable. |
| 3.3 | Work site is rehabilitated, cleaned up and made safe in accordance with established procedures. |
| 3.4 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
| 3.5 | Relevant work permit(s) are signed off and, the LV services and associated equipment are returned to service in accordance with |

ELEMENT

PERFORMANCE CRITERIA

requirements.

- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining low voltage services (underground).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01–TIS37A Remote area LV underground services

Evidence shall show an understanding of the installation, maintenance and connection of low voltage underground service lines and associated equipment (between the connection point and the point of supply to the customers' premises) in remote areas to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation, maintenance and connection of low voltage underground service lines and associated equipment.

T2 Types, sizes and characteristics of low voltage underground services (Two-core, Three-core, Four-core, Cable cross-sectional area of conductors, current ratings, cable insulation materials)

T3 Types and characteristics of low voltage service associated equipment (Conduit, Jointing gloves, Cable labelling, Pillars, Pits)

T4 Requirements prior to the installation of underground service (Service documentation, minimum depths to assets in ground, relevant electrical access permit, MEN system)

T5 Types of installation plant, equipment and tools (service cable puller, Shovels, stripping tool, ABC spanner, ABC spreader, spanners, screwdrivers etc)

T6 Installation techniques (Methods of laying cable, terminating, effect of poor connections)

T7 Testing and commissioning underground services (continuity testing, insulation testing, polarity testing, phase sequencing, neutral integrity testing)

T8 Completing Enterprise documentation

T9 Techniques for the maintenance of underground services (Inspection, Types of faults, Diagnosis and repair of faults, removing and replacing services and fuses.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least two of the following:	Underground pillar/pit connection (single phase) Underground pillar/pit connection (three phase*) Underground to overhead connection (* must do)
B	At least one of the following:	Fuse units Circuit breakers Service links
C	At least four of the following:	Polarity test * Phase rotation test Continuity test Voltage test Insulation resistance test (* must do)
D	At least one of the following:	Aluminium LV cable XLPE cable Copper LV cable
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of underground LV services.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of underground low voltage services as they relate to distribution circuits and associated equipment and includes the identification of faults.

Installation may include, the laying and connection of service cables, connection of the service cable to underground equipment, the fitting and connection of fuses or circuit breakers and the testing and commissioning of the service

Service includes the connection between the customers' point of supply and the underground pillar/pit connection (single phase), underground pillar/pit connection (three phase) and or underground to overhead connection.

Maintenance may include the identification and diagnosis of faults, the removal, replacement or repair of service cables and associated hardware and the temporary installation of services and associated equipment and the testing and commissioning of the service.

Testing procedures may include continuity, polarity, phase rotation, insulation resistance and voltage.

Testing equipment may include, digital/analogue voltage testers, multimeters, phase rotation testers, load testers, insulation resistance and continuity testers.

Associated hardware may include fuse units, circuit breakers, contactors, mains connection boxes.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures

RANGE STATEMENT

- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDNIS38A Install and maintain public lighting systems in remote communities

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation, maintenance and repair of public lighting systems. This also includes the inspection, testing and commissioning of the system associated with the street lighting circuit, the associated hardware and the earthing system. Installation will include the installation of, the associated hardware and components and, the wiring and earthing system. Maintenance may also include work on energised LV overhead or underground public lighting systems including the diagnosis of faults and the updating of relevant system data and or public lighting maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place

License to practice

3)

subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE103A	Solve problems in extra-low voltage, single path circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with

Prerequisite Unit(s)	4)	
		electrotechnology work
	UEENEEK101A	Maintain safety and tidiness of remote area power supply systems
	UEENEEK102A	Work safely with remote area power supply systems
	UEENEEK116A	Maintain and repair remote area power generation facilities
	UEENEEK120A	Maintain operation remote area power plant
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDNIS32A	Solve electrical problems in remote community network apparatus
	UETTDNIS33A	Solve electrical problems in remote community network systems
	UETTDNIS99A	Test and Verify Distribution Remote Area Installations

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of

Employability Skills

5)

competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare for the installation and maintenance of public lighting systems	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.3	OHS policies and procedures related to requirements and established procedures for the installation and maintenance of public lighting systems are obtained and confirmed for the purposes of the work to be performed and communicated.
		1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
		1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|---|--|
| | 1.6 | Relevant work permits are obtained to access and perform work according to requirements and/or established procedures. |
| | 1.7 | Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order. |
| | 1.8 | Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements. |
| | 1.9 | Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary. |
| | 1.10 | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures. |
| | 1.11 | Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures. |
| | 1.12 | Traffic management plan is identified and implemented. |
| 2 | Carry out installation and maintenance of public lighting systems | |
| | 2.1 | OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures. |
| | 2.2 | Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed. |
| | 2.3 | Essential knowledge and associated skills are applied in the safe installation and maintenance of public lighting systems to ensure completion |

ELEMENT

PERFORMANCE CRITERIA

- in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.4 Excavation/foundation construction is inspected, and confirmed as being in accordance with established procedures.
 - 2.5 Associated hardware, fittings and control gear are installed as per established procedures.
 - 2.6 Earthing system and street lighting circuit is installed as per established procedures.
 - 2.7 Inspection of public lighting and associated hardware is conducted to ascertain that it conforms to requirements/established procedures.
 - 2.8 Maintenance, including repair and/or replacement of the public lighting system is carried out, in accordance with the work schedule and requirements/established procedures.
 - 2.9 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
 - 2.10 Unplanned events in the installation and maintenance of public lighting systems are undertaken within the scope of established procedures.
 - 2.11 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
 - 2.12 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 3 Complete the installation and maintenance of public lighting systems
 - 3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures
 - 3.2 Accidents and/or injuries are reported in accordance with requirements/established

ELEMENT

PERFORMANCE CRITERIA

procedures, where applicable.

- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, the public lighting system is returned to service in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining public lighting systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS38A Remote area public lighting and associated equipment

Evidence shall show an understanding of the installation and maintenance of public lighting systems and associated equipment in remote communities to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations, local government and or enterprise requirements pertaining to the installation and maintenance of public lighting systems and associated equipment

T2 Types of lighting systems (Overhead and underground)

T3 Safety precautions specific to working on street lighting (Safe working practices and procedures, Working at heights, Working in confined spaces, Permit to work systems and isolation procedures)

T4 Basic public lighting principles (Electromagnetic spectrum, Principles of colour Behaviour of light, Factors that affect illumination)

T5 Requirements for the use of enterprise construction manuals, system, diagrams/plans and drawings (Constructing streetlight, Street lighting circuits, earthing system)

T6 Types of tools and equipment used for installation and maintenance

T7 Types and function of lanterns/Luminaries/lamps, control equipment, poles and associated hardware used for street lighting (HP mercury vapour, LP and HP sodium vapour, fluorescent, quartz-halogen, wood, concrete, steel, composite, choke boxes, photo-electric cells, time switches, contactor boxes, brackets, street lights standards)

T8 Techniques for the installation of street lighting systems

T9 Techniques for the inspection, testing and commissioning of street lighting systems

T10 Techniques for the maintenance of street lighting systems (diagnosing of faults, removing, repairing, replacement and cleaning of public lighting and associated hardware, controlling and switching of lighting systems)

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least one of the following:	Wood Concrete Steel Composite
B	At least two of the following:	HP mercury vapour, LP and HP sodium vapour Fluorescent Quartz-halogen
C	At least three of the following:	Voltage detectors* Insulation resistance testers Clamp-on ammeters Continuity testers Fault indicators (* must use)
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to undertake actual installation and maintenance of public lighting systems.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

Competency shall be demonstrated in relation to the installation, maintenance and repair of public lighting systems, including the inspection, testing and commissioning of the system associated with the street lighting circuit, the associated hardware and the earthing system.

Maintenance may include the removal, repair, replacement and cleaning of public lighting and associated hardware.

Public lighting system may include lanterns/luminaires, lamps or control equipment in overhead and underground reticulated areas, poles and columns.

Associated hardware may include brackets, choke boxes, photo-electric cells, time switches, contactor boxes and appropriate nuts and bolts.

Testing equipment may include LV detectors and fault indicators.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect

RANGE STATEMENT

- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS41A Install network infrastructure electrical equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation of electrical equipment, such as fuse switches, drop out switches, sectionalisers, links, surge arrestors, gas filled and or oil filled switches, which are relevant to the transmission, distribution and rail networks. It includes the termination/connection of the equipment in accordance to enterprise requirements; the relevant pre-commissioning tests involving the equipment/system and the interpretation of these tests against agreed specifications.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice**3)**

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Common Unit Group

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Prerequisite Unit(s)	4)	
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	Transmission Overhead Pathway Group	
	Unit Code	Unit Title
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDRTTP26A	Install transmission structures and associated hardware
	UETTDRTTP27A	Maintain transmission structures and associated hardware
	UETTDRTTP29A	Install and maintain transmission overhead conductors and cables
	Distribution Overhead Pathway Group	
	Unit Code	Unit Title
	UETTDSDP12A	Maintain overhead energised low voltage conductors and cables
	UETTDNIS52A	Install and maintain poles, structures and associated hardware
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDNIS56A	Install and maintain low voltage

Prerequisite Unit(s)	4)	overhead services
		Rail Traction Pathway Group
	Unit Code	Unit Title
	UETTDNIS52A	Install and maintain poles, structures and associated hardware
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDNRRT21A	Install traction overhead wiring systems
	UETTDNRRT22A	Maintain traction overhead wiring systems
	UETTDNRRT23A	Install rail traction bonds
	UETTDNRRT27A	Install overhead traction components and equipment
	UETTDNRRT28A	Maintain overhead traction components and equipment
		Distribution Cable Jointing Pathway Group
	Unit Code	Unit Title
	UETTDNRRCJ21A	Lay ESI electrical cables
	UETTDNRRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
	UETTDNRRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
	UETTDNIS55A	Install and maintain low voltage underground services

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

- | | |
|--|--|
| 1 Prepare for the installation of electrical equipment (network infrastructure) | 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection. |
| | 1.2 Relevant requirements and established procedures for the work are communicated to all |

ELEMENT**PERFORMANCE CRITERIA**

- personnel and identified for all work sites.
- 1.3 OHS policies and procedures related to requirements and established procedures for the installation of electrical equipment (network infrastructure) are obtained and confirmed for the purposes of the work to be performed and communicated.
 - 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
 - 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
 - 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
 - 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
 - 1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
 - 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
 - 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
 - 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established

ELEMENT	PERFORMANCE CRITERIA
	procedures.
	1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.
2 Carry out installation of electrical equipment (network infrastructure)	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Essential knowledge and associated skills are applied in the safe installation of electrical equipment (network infrastructure) to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.4 Electrical equipment and associated hardware is positioned, secured and terminated/connected in accordance with requirements and established procedures.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6 Unplanned events in the installation of electrical equipment (network infrastructure) are undertaken within the scope of established procedures.
	2.7 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.8 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the installation of electrical equipment (network infrastructure)	3.1 Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, electrical equipment (network infrastructure) are returned to service in accordance with requirements.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing electrical equipment (network infrastructure).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS41A Substations, power transformers and reactors

Evidence shall show an understanding of substations and power transformers to an extent indicated by the following aspects:

T1 Relationship between the substations within an overall power system

- Note: Examples include purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment

T2 Characteristics of a power transformer

- Note: Examples include basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling

T3 Auxiliary equipment used on transformers encompassing:

- Function and basic operation

T4 Maintenance of a power transformer

- Note: Examples include basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault finding procedures

T5 Characteristics of a reactors encompassing:

- Description and purpose

KS02-TIS41A Switchgear installation

Evidence shall show an understanding of the installation of switchgear and associated equipment to an extent indicated by the following aspects:

T1 Types and function of various switchgear

- Note: Examples include isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques

T2 Types of equipment

- Note: Examples include transformers, reactors, regulators, capacitors, relays, surge

REQUIRED SKILLS AND KNOWLEDGE

arrestors, fault indicators and mobile generators

T3 Installation procedures for switchgear and equipment encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Assembly and erecting procedures
- Earthing requirements and techniques
- Pole mounted locations

T4 Testing and commissioning encompassing:

- Electricity supply industry standards and procedures

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may

be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated

- environment; and
- Demonstrate an appropriate level of employability skills; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Any three of the following:	Fuse switches Dropout fuses Sectionalisers Disconnectors Links Fuses Surge arrestors
B	Any one of the following:	Reclosers Motorised switches Gas filled switches Ring main units Line fault indicators Oil filled switches Air break switches
C	Any one of the following:	Transformers Reactors Regulators Capacitors
D	Any three of the following:	Voltage detectors Phasing equipment

		Clip-on ammeters Insulation resistance testers Recording meters Earth resistance tester
E	At least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation of electrical equipment in a network infrastructure.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit

applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation, termination/connection of overhead electrical equipment relevant to the transmission, distribution and rail networks, and includes pre-commissioning.

Electrical equipment and associated hardware may include relevant transmission or distribution linework/network; switchgear (e.g. reclosers, sectionalisers, drop-out fuses, disconnectors, isolators, air break switches, gas filled switches, links, fuses, fuse switches and circuit breakers); transformers (e.g. padmount, pole-mounted and mobile); reactors; fault indicators; regulators; street lighting control points; capacitors; cables; underground/overhead cable terminations; relays (simple); mobile generators and surge arrestors; support brackets and the like.

It does not include the energisation of equipment in a highly complex, interdependent and interconnected electricity supply Network system, where the affects of unintended consequences on the system are high risk and appropriate personnel effect energisation.

Test and recording equipment includes voltage detectors, phasing equipment, tong ammeters, voltmeters, recording meters and insulation resistance testers used for the purposes as intended and according to requirements, and does not include use of such in energising installed equipment in a highly complex, interdependent and interconnected electricity supply Network system, where the affects of unintended consequences on the system are high risk.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures

RANGE STATEMENT

- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS42A Maintain network infrastructure electrical equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of electrical equipment and associated hardware, such as fuse switches, drop out switches, sectionalisers, links, surge arrestors, gas filled and or oil filled switches, relevant to the transmission, distribution and rail traction networks and includes the repair and/or replacement of "like for like" electrical equipment and associated hardware as well as the termination and/or connection of this equipment according to requirements and may include sampling of insulating oils. It also encompasses the identification of faults, the pre-commissioning tests involving the equipment/system and the interpretation of these tests against agreed specifications. It excludes the energisation of the equipment maintained in a highly complex, interdependent and interconnected electricity supply Network system, where the affects of unintended consequences on the system are high risk and appropriate personnel effect energisation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components

Prerequisite Unit(s)**4)**

UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDREL16A	Working safely near live electrical apparatus

Transmission Overhead Pathway Group

Unit Code	Unit Title
UETTDNIS41A	Install network infrastructure electrical equipment
UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDRTTP26A	Install transmission structures and associated hardware
UETTDRTTP27A	Maintain transmission structures and associated hardware
UETTDRTTP29A	Install and maintain transmission overhead conductors and cables

Distribution Overhead Pathway Group

Unit Code	Unit Title
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Prerequisite Unit(s)**4)**

UETTDRDP12A	Maintain overhead energised low voltage conductors and cables
UETTDRIS41A	Install network infrastructure electrical equipment
UETTDRIS52A	Install and maintain poles, structures and associated hardware
UETTDRIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDRIS56A	Install and maintain low voltage overhead services

Rail Traction Pathway Group

Unit Code	Unit Title
UETTDRIS41A	Install network infrastructure electrical equipment
UETTDRIS52A	Install and maintain poles, structures and associated hardware
UETTDRIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDRRT21A	Install traction overhead wiring systems
UETTDRRT22A	Maintain traction overhead wiring systems
UETTDRRT23A	Install rail traction bonds
UETTDRRT27A	Install overhead traction components and equipment
UETTDRRT28A	Maintain overhead traction components and equipment

Distribution Cable Jointing Pathway Group

Unit Code	Unit Title
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Prerequisite Unit(s)	4)	
	UETTDRCJ21A	Lay ESI electrical cables
	UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
	UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
	UETTDRCJ41A	Install network infrastructure electrical equipment
	UETTDRCJ55A	Install and maintain low voltage underground services

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the maintenance of electrical equipment (network infrastructure)	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures the maintenance of electrical equipment (network infrastructure) are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p>

ELEMENT	PERFORMANCE CRITERIA
	1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.
2 Carry out maintenance of electrical equipment (network infrastructure)	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Essential knowledge and associated skills are applied in the safe maintenance of electrical equipment (network infrastructure) to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.4 Maintenance, including repair and/or replacement of electrical equipment (network infrastructure) is carried out, in accordance with the work schedule and requirements/established

ELEMENT	PERFORMANCE CRITERIA
	procedures.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6 Unplanned events in the maintenance of electrical equipment (network infrastructure) are undertaken within the scope of established procedures.
	2.7 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.8 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the maintenance of electrical equipment (network infrastructure)	3.1 Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, electrical equipment (network infrastructure) is returned to service in accordance with requirements.
	3.6 Works completion records, reports, as installed/modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining electrical equipment (network infrastructure).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS42A Switchgear installation maintenance

Evidence shall show an understanding of the installation of switchgear and associated equipment to an extent indicated by the following aspects:

T1 Types and function of various switchgear

- Note: Examples include isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques

T2 Types of equipment

- Note: Examples include transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators

T3 Maintenance procedures for switchgear and equipment encompassing:

- Diagnosing and rectifying faults according to electricity supply industry standards and procedures

T4 Testing and commissioning encompassing:

- Electricity supply industry standards and procedures

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Any three of the following:	Fuse switches Dropout fuses Sectionalisers Disconnectors Links Fuses Surge arrestors
B	Any one of the following:	Reclosers Gas filled switches Ring main units Oil filled switches Air break switches
C	Any one of the following:	Transformers Reactors Regulators Capacitors Relays Line fault indicators
D	Any three of the following:	Voltage detectors Phasing equipment Clip-on ammeters Insulation resistance testers Recording meters Earth resistance testers
E	At least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the

		above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of electrical equipment in the network infrastructure.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of overhead electrical equipment relevant to the transmission, distribution and rail networks.

Maintenance may include the removal, repair and replacement of electrical equipment encompassing “like for like” and associated hardware as well as the termination and/or connection of this equipment according to requirements and may include sampling of insulating oils. It also encompasses the identification of faults; the pre-commissioning tests involving the equipment/system and the interpretation of these tests against agreed specifications. It excludes the energisation of the equipment maintained in a highly complex, interdependent and interconnected electricity supply Network system, where the affects of unintended consequences on the system are high risk and appropriate personnel effect energisation.

Electrical equipment and associated hardware may include relevant transmission or distribution linework/network; switchgear (e.g. reclosers, sectionalisers, drop-out fuses, disconnectors, isolators, air break switches, gas filled switches, links, fuses, fuse switches and circuit breakers); transformers (e.g. padmount, pole-mounted and mobile); reactors; fault indicators; regulators; street lighting control points; capacitors; cables; underground/overhead cable terminations; underground cable joints; relays (simple); mobile generators and surge arrestors; support brackets and the like.

Test and recording equipment includes voltage detectors, phasing equipment, tong ammeters, voltmeters, recording meters, insulation resistance testers and may include the, sampling of transformers, switchgear and cable insulating oil and tests for dielectric strength and moisture used for the purposes as intended and according to requirements, and does not include use of such in energising equipment and circuits in a highly complex, interdependent and interconnected electricity supply Network system, where the affects of unintended consequences on the system are high risk.

Equipment may include Pump, filter press, hoses, pipes, soil kits, sample bottles, storage vessels etc.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation

RANGE STATEMENT

- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Industry Specific Cross-Discipline Units

UETTDRIS43A Perform low voltage field switching operation to a given schedule

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the conducting of low voltage switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule and in accordance with enterprise procedures. It covers low voltage distribution systems in field situations but also includes paralleling in accordance with the switching schedule. It also encompasses the procedure of; communicating with the Switching Control Officer or Electrical Control Officer, isolating the electrical equipment and the line or work site, as well as proving that the area is de-energised and earthed, issuing/accepting electrical permits and the returning of the affected circuits to service.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may

License to practice**3)**

require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Electrical

Common Unit Group

Unit Code

Unit Title

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. Circuits

Prerequisite Unit(s) 4)

UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits
UETTDREL16A	Working safely near live electrical apparatus

Transmission Overhead Pathway Group

Unit Code	Unit Title
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDRTTP26A	Install transmission structures and associated hardware
UETTDRTTP27A	Maintain transmission structures and associated hardware
UETTDRTTP29A	Install and maintain transmission overhead conductors and cables

Distribution Overhead Pathway Group

Unit Code	Unit Title
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDSDRP12A	Maintain overhead energised low voltage conductors and cables

Prerequisite Unit(s)**4)**

UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDNIS41A	Install network infrastructure electrical equipment
UETTDNIS42A	Maintain network infrastructure electrical equipment
UETTDNIS52A	Install and maintain poles, structures and associated hardware
UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDNIS56A	Install and maintain low voltage overhead services

Rail Traction Pathway Group

Unit Code	Unit Title
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDNIS52A	Install and maintain poles, structures and associated hardware
UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDNRRT21A	Install traction overhead wiring systems
UETTDNRRT22A	Maintain traction overhead wiring systems
UETTDNRRT23A	Install rail traction bonds
UETTDNRRT27A	Install overhead traction components and equipment
UETTDNRRT28A	Maintain overhead traction

Prerequisite Unit(s)

4)

components and equipment

Distribution Cable Jointing Pathway Group

Unit Code	Unit Title
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDRCJ21A	Lay ESI electrical cables
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDNIS41A	Install network infrastructure electrical equipment
UETTDNIS42A	Maintain network infrastructure electrical equipment
UETTDNIS55A	Install and maintain low voltage underground services

Electrical Pathway Group

Unit Code	Unit Title
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical

Prerequisite Unit(s)	4)	installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDRIS67A	Solve problems in energy supply network equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the LV field switching to a given schedule	<p>1.1 Switching and work schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for LV switching are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant authority is obtained to perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p>

ELEMENT**PERFORMANCE CRITERIA**

- | | | |
|---|--|---|
| | 1.8 | Relevant personnel at worksite are confirmed current in First Aid and other related work procedures according to requirements. |
| | 1.9 | Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary. |
| | 1.10 | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures. |
| | 1.11 | Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures. |
| | 1.12 | Road signs, barriers and warning devices are positioned in accordance with requirements. |
| 2 | Carry out LV field switching to a given schedule | |
| | 2.1 | OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures. |
| | 2.2 | Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed. |
| | 2.3 | Essential knowledge and associated skills in the safe LV field switching to a given schedule are applied to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements. |
| | 2.4 | Communications with Switching Control Officer are established and maintained throughout the isolation operation according to established procedures. |
| | 2.5 | Electrical equipment and associated circuits line/network or work site to be switched |

ELEMENT**PERFORMANCE CRITERIA**

- including paralleling is isolated and proved de-energised using appropriate devices and earthed where required according to requirements and established procedures.
- 2.6 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.7 Unplanned events occurring during LV field switching to a given schedule are responded to and undertaken within the scope of established procedures.
- 2.8 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.9 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
- 3 Complete the LV field switching to a given schedule
- 3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
- 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant permit(s) are signed off, safety devices are removed, and the system is re-energised and returned to service in accordance with requirements/established procedures.
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and

ELEMENT

PERFORMANCE CRITERIA

appropriate personnel and authority notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of performing high voltage field switching to a given schedule.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS43A LV Switching

Evidence shall show an understanding of LV system switching principles including switching authorisation procedures to an extent indicated by the following aspects:

T1 Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching

T2 Requirements for the use of manuals, system diagrams/plans and drawings encompassing:

- Types, characteristics and capabilities of electrical apparatus
- Use, characteristics and capabilities of specialised tools and testing equipment
- LV network interconnectors for alternate sources of supply and possible backfeed.

T3 Procedures for obtaining correct LV switching authorisation encompassing:

- Identification of hazards, assessing and controlling risks
- Safety procedures and precautions
- Safe approach distances
- Responsibilities and protocols
- Identifying switching resources
- Procedures for obtaining electrical access permits/authorities
- Requirements for team switching
- Procedures for coordination of operations

T4 Techniques in LV system switching encompassing:

- Isolation procedures and proving dead
- Pre-switching checks
- Switching operational procedures
- Emergency fault procedures
- Energisation procedures

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	Approvals/clearances Access authority /permits
B	Any two of the following:	Voltage detectors Polarity testers Phase rotation indicators
C	Any one of the following:	LV links LV bridges LV fuses
D	At least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual performance of LV field switching to a given schedule.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the conducting of low voltage switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule as it relates to low voltage distribution systems in field situations but also includes paralleling in accordance with the switching schedule.

Operation of circuit isolation devices associated with energy reticulation systems/networks is confined to low voltage systems in field situations which are performed in accordance with a switching schedule and established procedures.

Switching Control Officer refers to an appropriate person designated as such by regulations, codes or enterprise arrangements who is responsible for coordinating and directing switching activities in consultation with field operatives.

Switchgear may include Low Voltage fuses, Low Voltage links and bridges.

Specialist tools and devices may include Low Voltage detectors, Low Voltage polarity testers and Low Voltage phase rotation indicators.

Switching program/schedule refers to structure, switch or equipment number; locations; Low Voltage distributor, spur or feeder; outage times; works order/plan

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards

RANGE STATEMENT

- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS44A Perform HV field switching operation to a given schedule

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the carrying out of high voltage switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule and according to enterprise procedures. It also encompasses the process of; communicating with the Switching Control Officer or Electrical Control Officer, isolating the electrical equipment and the line or work site, as well as proving that the area is de-energised and earthed, issuing/accepting electrical permits and the returning of the affected circuits to service.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice**3)**

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Electrical

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology

Prerequisite Unit(s)**4)**

equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. Circuits

UETTDREL16A Working safely near live electrical apparatus

Transmission Overhead Pathway Group

Unit Code	Unit Title
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTD RTP26A	Install transmission structures and associated hardware
UETTD RTP27A	Maintain transmission structures and associated hardware
UETTD RTP29A	Install and maintain transmission overhead conductors and cables

Distribution Overhead Pathway Group

Prerequisite Unit(s)**4)**

UETTDNIS41A Install network infrastructure electrical equipment

UETTDNIS42A Maintain network infrastructure electrical equipment

UETTDNIS52A Install and maintain poles, structures and associated hardware

UETTDNIS54A Install and maintain poles, structures, overhead conductors and cables

UETTDNIS56A Install and maintain low voltage overhead services

Rail Traction Pathway Group

Unit Code	Unit Title
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UETTDREL11A	Apply sustainable energy and environmental procedures
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UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
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UETTDNIS52A	Install and maintain poles, structures and associated hardware
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UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
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UETTDNRRT21A	Install traction overhead wiring systems
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UETTDNRRT22A	Maintain traction overhead wiring systems
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UETTDNRRT23A	Install rail traction bonds
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UETTDNRRT27A	Install overhead traction components and equipment
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UETTDNRRT28A	Maintain overhead traction components and equipment
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Distribution Cable Jointing Pathway Group

Unit Code	Unit Title
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Prerequisite Unit(s)**4)**

UETTDRCJ21A	Lay ESI electrical cables
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDRCJ41A	Install network infrastructure electrical equipment
UETTDRCJ42A	Maintain network infrastructure electrical equipment
UETTDRCJ55A	Install and maintain low voltage underground services

Electrical Pathway Group

Unit Code	Unit Title
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits

Prerequisite Unit(s) 4)

UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
UETTDRIS67A	Solve problems in energy supply network equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to undertake HV switching procedures to a given schedule	1.1 Switching and work schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 OHS policies and procedures related to requirements and established procedures for HV switching are obtained and confirmed for the purposes of the work to be performed and communicated.
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
	1.6 Relevant authority is obtained to perform work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
	1.8 Relevant personnel at worksite are confirmed current in First Aid and other related work procedures according to requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Site is prepared according to the work schedule

ELEMENT**PERFORMANCE CRITERIA**

- and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.
- 2 Carry out HV switching procedures to a given schedule
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
- 2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Essential knowledge and associated skills are applied for the safe undertaking of HV switching procedures to a given schedule to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.4 Communications with Switching Control Officer are established and maintained throughout the isolation operation according to established procedures.
- 2.5 Electrical equipment and associated circuits line/network or work site to be switched including paralleling is isolated and proved de-energised using appropriate devices and earthed where required according to requirements and established procedures.
- 2.6 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.

ELEMENT	PERFORMANCE CRITERIA
	2.7 Unplanned events occurring during HV switching procedures to a given schedule are responded to and undertaken within the scope of established procedures.
	2.8 Relevant permits are prepared and issued in accordance with established procedures.
	2.9 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.10 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete HV switching procedures to a given schedule	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant permit(s) are signed off, safety devices are removed, and the system is re-energised and returned to service in accordance with requirements/established procedures.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel and authority notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of performing high voltage field switching to a given schedule.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS44A High voltage switching

Evidence shall show an understanding of high voltage switching principles to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule

T2 Requirements for the use of manuals, system diagrams/plans and drawings encompassing:

- Types, characteristics and capabilities of electrical apparatus
- Use, characteristics and capabilities of specialised tools and testing equipment
- Network interconnectors source of possible backfeed

T3 Role of the HV switching operator

T4 Procedures for obtaining correct HV switching authorisation encompassing:

- Identification of OHS hazards, assessing and controlling risks
- Safety procedures and precautions
- Safe approach distances
- Responsibilities and protocols
- Identifying switching resources
- Procedures for obtaining electrical access permits/authorities
- Requirements for team switching
- Procedures for coordination of operations

T5 Use and operation of equipment associated with HV overhead and substation equipment encompassing:

- Test instruments
- Sticks
- Interrupters
- Arc stranglers

T6 Operation of protection systems and substation equipment

REQUIRED SKILLS AND KNOWLEDGE

- Note: Examples include fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications
- T7 Types and categories of HV switchgear
- T8 Application, function and operating capabilities of switchgear
- T9 Restrictions pertaining to HV switching equipment
- T10 Procedures for the isolation of HV transmission main and working earths
- T11 Earthing HV electrical apparatus practices and procedures for access encompassing:
- Purposes of Operational and additional work part - on-site earths
 - Factors determining the location and effectiveness of Operational earthing
 - Acceptable industry procedures
 - Personal protective equipment
- T12 High voltage switching techniques
- Pre-switching checks
 - Switching operational procedures
 - Isolation procedures and proving dead/de-energised
 - Earthing procedures
 - Pre-switching checks
 - Switching operational procedures
 - Emergency fault procedures
 - Energisation procedures
- T13 Application and function of SWER system components
- Circuit arrangement
 - Principle of operation
 - Hazards and procedures associated with faulty SWER earth systems
 - Procedure to isolate, energise and commission SWER substations
- T14 Operation of HV overhead switching or indicating devices encompassing:
- Identifying hazards, assessing and controlling risks associated with HV switchgear operation
 - Systematic and defensive techniques
 - Mobile radio procedures
 - Double isolation procedures
 - Note: Examples include fuses; disconnect fuses; load switching; live line

REQUIRED SKILLS AND KNOWLEDGE

indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing sticks; phasing tester

KS02-TIS44A High voltage fault switching principles

Evidence shall show an understanding of high voltage fault switching principles to an extent indicated by the following aspects:

T1 Primary causes, effects and types of HV electrical faults

T2 HV protection devices encompassing:

- Main components
- Types
- Categories
- Applications
- Functions

T3 Basic principle of operation of HV system protection devices

T4 Protection co-ordination and protection —zoning

T5 HV feeder auto-reclosing suppression encompassing:

- Function
- Application

T6 Circuit condition requirements and switching considerations when paralleling and separating HV feeders

KS03-TIS44A High voltage distribution transformer principles

Evidence shall show an understanding of high voltage distribution transformer principles to an extent indicated by the following aspects:

T1 Operation of HV distribution transformers encompassing:

- Principle governing factors for transformer ratings
- Protection and alarms
- Operating limitations and the relationship between transformer and HV fuse rating
- Purpose and principle operation of HV distribution transformer tap changers
- HV distribution transformer and transformer — cable combination switching practices
- Paralleling requirements
- Isolation and earthing procedures for access
- Common distribution transformer and associated electrical apparatus faults

T2 HV underground switching equipment

- Note: Examples include arc strangles, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers

REQUIRED SKILLS AND KNOWLEDGE

KS04-TIS44A Feeder automation system

Evidence shall show an understanding of feeder automation system to an extent indicated by the following aspects:

- T1 Function of feeder automation system and the main components
- T2 Operation procedure for a remote field device from a local control station
- T3 Functions of —System Control and Data Acquisition (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components
- T4 SCADA system security interlocks and access restrictions
- T5 SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciate System and Local Control Station
- T6 Function of the main components of a local/remote control system
- T7 Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciate System and Local Control Station

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is

recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and

range; and

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Approvals/clearances Access permits
B	All of the following:	HV operating sticks HV operating earths HV detectors
C	At least one of the following:	HV phasing sticks HV ground mounted equipment isolating handles and earths
D	At least two of the following:	HV links Air break switches Fuses
E	At least three of the following:	Reclosers Ring main units

		Circuit breakers Isolators Earth switches Sectionalisers
F	At least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual performance of HV field switching to a given schedule.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and

associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the carrying out of high voltage switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule.

Switching operations are confined to those performed in field situations, not in system control rooms or substations and may include electrical load transfer.

Switchgear includes reclosers, ring main units, circuit breakers, isolators, earth switches, sectionalisers, HV links, air break switches, live line clamps, and fuses.

Specialist tools may include HV phasing sticks, HV link sticks, HV live-line clamp operating sticks, HV ground transformer isolating handles and associated earths, HV overhead operating earths and HV detectors.

Switching program/schedule including necessary detail, e.g. structure, switch or equipment number; locations; HV feeder; outage times; works plan/order;

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards

RANGE STATEMENT

- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS45A Perform power system substation switching operation to a given schedule

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the conducting of switching operations in a substation in accordance to a given instructions, switching schedule and established enterprises procedures. It encompasses the operation of substation switching devices such as circuit breakers, air break switches, fuses, reclosers, ring main units and isolators.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice

3)

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines

Prerequisite Unit(s)	4)
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UEENEEG103A	Install low voltage wiring and accessories
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits
UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
UETTDREL16A	Working safely near live electrical apparatus
UETTDNIS62A	Implement and monitor the power system organisational OHS policies,

Prerequisite Unit(s) 4)

procedures and programs

UETTDRIS63A

Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for substation switching to a given schedule	<p>1.1 Switching and work schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for substation switching are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant authority is obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p> <p>1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements</p> <p>1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.</p>

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|--|---|
| | 1.10 | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures. |
| | 1.11 | Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures. |
| | 1.12 | Road signs, barriers and warning devices are positioned in accordance with requirements. |
| 2 | Carry out substation switching to a given schedule | |
| | 2.1 | OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures. |
| | 2.2 | Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed. |
| | 2.3 | Essential knowledge and associated skills are applied in safe substation switching to a given schedule to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements |
| | 2.4 | Communications with Switching Control Officer are established and maintained throughout the isolation operation according to established procedures. |
| | 2.5 | Electrical equipment and associated circuits line/network or work site to be switched is isolated and proved de-energised using appropriate devices, earthed where required and load transfer successfully achieved according to requirements and established procedures. |
| | 2.6 | Substation switching to a given schedule is carried out, in accordance with the work schedule and requirements/established procedures. |

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|---|---|--|
| | 2.7 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. | |
| | 2.8 | Unplanned events occurring during substation switching to a given schedule are responded to and undertaken within the scope of established procedures. | |
| | 2.9 | Relevant permits are prepared and issued in accordance with established procedures. | |
| | 2.10 | Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills. | |
| | 2.11 | Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures | |
| 3 | Complete substation switching to a given schedule | 3.1 | Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures. |
| | | 3.2 | Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable. |
| | | 3.3 | Work site is rehabilitated, cleaned up and made safe in accordance with established procedures. |
| | | 3.4 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
| | | 3.5 | Relevant permit(s) are signed off, safety devices are removed, and the system is re-energised and returned to service in accordance with requirements/established procedures. |
| | | 3.6 | Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel and authority notified. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of performing substation switching to a given schedule.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS45A Overhead distribution network infrastructure

Evidence shall show an understanding of overhead distribution network infrastructure to an extent indicated by the following aspects:

T1 Installation of switchgear and associated equipment encompassing:

- Types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques
- Types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- Installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques, pole mounted locations
- Maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry standards and procedures,
- Testing and commissioning - electricity supply industry standards and procedures.

T2 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

T3 High voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and

REQUIRED SKILLS AND KNOWLEDGE

capabilities of specialised tools and testing equipment, network interconnectors
source of possible backfeed

- Role of the HV switching operator
- Operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- Types and categories of HV switchgear
- Application, function and operating capabilities of switchgear
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV transmission main and working earths
- Earthing HV electrical apparatus practices and procedures for access - purposes of “Operational” and additional work part “on-site” earths, factors determining the location and effectiveness of “Operational” earthing, acceptable industry procedures, personal protective equipment, high voltage switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T4 High voltage distribution transformer principles encompassing:

- Operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer — cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution transformer and associated electrical apparatus faults.
- HV underground switching equipment - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers

T5 High voltage SWER system encompassing:

- Application and function of SWER system components
- Circuit arrangement
- Principle of operation
- Hazards and procedures associated with faulty SWER earth systems
- Procedure to isolate, energise and commission SWER substations

T6 Feeder automation system encompassing:

- Function of feeder automation system and the main components
- Operation procedure for a remote field device from a local control station
- Functions of “System Control and Data Acquisition” (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components

REQUIRED SKILLS AND KNOWLEDGE

- SCADA system security interlocks and access restrictions
- SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciated System and Local Control Station
- Function of the main components of a local/remote control system
- Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciated System and Local Control Station.

T7 HV overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to HV overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment.
- Role and responsibilities of the HV switching operator
- Operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- HV switchgear – types, categories, application, operating capabilities.
- Operation of HV overhead switching or indicating devices - fuses; disconnect fuses; load switching; live line indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing sticks; phasing tester
- Operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing; HV switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET09”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	Approvals/clearances Access permits
B	All of the following:	Operating sticks Operating earths Voltage detectors
C	All of the following:	Phasing equipment Ground equipment isolating handles and earths
D	Any one of the following:	Links Air break switches Fuses
E	Any two of the following:	Reclosers Ring main units Circuit breakers
F	At least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to undertake actual substation switching to a given schedule.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the carrying out of switching operations in a substation in accordance to a given instructions and switching schedule.

Switchgear includes ring main units, circuit breakers, isolators, earth switches, HV links, air break switches, capacitor banks, reactor banks, line/wave traps and fuses. (Refer to Definition 25)

Specialist tools include HV phasing sticks, HV link sticks, HV live-line clamp operating sticks, HV ground transformer isolating handles and associated earths, HV overhead operating earths and HV detectors.

Switching program/schedule including necessary detail, e.g. structure, switch or equipment number; locations; HV feeder; outage times; works plan/order.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect

RANGE STATEMENT

- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS46A Install and maintain ESI network infrastructure electrical equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of electrical equipment, such as fuse switches, drop out switches, sectionalisers, links, surge arrestors, gas filled and or oil filled switches, which are relevant to the transmission, distribution and rail networks. It includes the termination/connection of the equipment in accordance to enterprise requirements; the repair and/or replacement of “like for like” electrical equipment and associated hardware, and may include sampling of insulating oils. It also encompasses the identification of faults, the relevant pre-commissioning tests involving the equipment/system and the interpretation of these tests against agreed specifications. It excludes the energisation of the equipment maintained in a highly complex, interdependent and interconnected electricity supply Network system, where the affects of unintended consequences on the system are high risk and appropriate personnel effect energisation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment

Prerequisite Unit(s)	4)	
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical

Prerequisite Unit(s)	4)	
		control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDNIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDNIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the installation and maintenance of network infrastructure electrical equipment	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the installation and or maintenance of network infrastructure electrical equipment are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p>

ELEMENT

PERFORMANCE CRITERIA

- 1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.
- 2 Carry out installation and maintenance of network infrastructure electrical equipment
 - 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
 - 2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
 - 2.3 Essential knowledge and associated skills are applied in the safe installation of network infrastructure electrical equipment to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
 - 2.4 Electrical equipment and associated hardware is positioned, secured and terminated/connected in accordance with requirements and established procedures.

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|--|---|
| | 2.5 | Maintenance, including repair and/or replacement of network infrastructure electrical equipment is carried out, in accordance with the work schedule and requirements/established procedures. |
| | 2.6 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| | 2.7 | Unplanned events in the installation of electrical equipment (network infrastructure) are undertaken within the scope of established procedures. |
| | 2.8 | Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills. |
| | 2.9 | Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures. |
| 3 | Complete the installation and maintenance of network infrastructure electrical equipment | |
| | 3.1 | Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures. |
| | 3.2 | Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable. |
| | 3.3 | Work site is rehabilitated, cleaned up and made safe in accordance with established procedures. |
| | 3.4 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
| | 3.5 | Relevant work permit(s) are signed off and, electrical equipment (network infrastructure) are returned to service in accordance with requirements. |
| | 3.6 | Works completion records, reports, as installed /modified drawing and/or documentation and |

ELEMENT

PERFORMANCE CRITERIA

information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing electrical equipment (network infrastructure).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS46A ESI network infrastructure electrical equipment

Evidence shall show an understanding of the ESI network infrastructure electrical equipment to an extent indicated by the following aspects:

T1 Mathematics techniques encompassing:

- Calculations involving fractions, decimals, ratios, proportions
- Calculations involving area, volume, mass and density
- Calculations involving transposition and substitution of formulae
- Calculations involving simple trigonometric problems.

T2 Engineering mechanics encompassing:

- Identification of basic concepts, principles and applications - Application of velocity, acceleration, force, density, torque, and pressure
- Applications of the SI units
- The relationship between work, power and energy
- Behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- Fundamentals of the basic laws of fluid mechanics.

T3 Materials properties encompassing:

- Identification and classification of engineering materials material properties
- Types and applications - properties of tensile strength, effects of temperature on the expansion of metals, ductibility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers.

T4 Basic rigging techniques encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with rigging including the operation of cranes, hoists and winches and relevant certification and licensing (if required)
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Safe use of rigging equipment, tools and associated equipment - types, techniques and application
- Site inspection procedures - identifying hazards, assessing and controlling risks,

REQUIRED SKILLS AND KNOWLEDGE

appropriate sequence of loading and unloading

- Determining the mass and dimensions of load
- Selection and inspection procedures - rigging equipment, materials and tools (natural and synthetic fibre ropes and chains, fittings, winch and capstan), ratings of wire ropes and slings, removing, repairing and replacing of damage parts.
- Techniques for assembling and erecting power winches and capstans
- Checking the integrity of support structure; visual inspection of load connections
- Techniques in moving, lifting, shifting, managing and placing loads - use of appropriate communication and signalling methods, codes of practice/compliance, enterprise and Commonwealth, State/Territory legislative requirements, weather conditions, erection of safety nets and lines, methods of fixing and anchoring loads, load stability.

T5 Procedure in providing store support encompassing:

- Classification and identification of equipment, components and tools
- Procedures for purchasing/ordering items, removing/dispatching items, stocktaking, security, bookkeeping/record keeping
- Material handling - warehouse/depot storage techniques, handling equipment, pallet lift trucks, forklifts, cable drum handling equipment.
- Safety procedures - storage and care of safety equipment, handling hazardous materials, storage of hazardous substances and dangerous goods, depot safety procedures.
- Manufacturers and suppliers information including material safety data sheets (MSDS)

T6 Generation systems encompassing:

- Methods of generating electricity - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
- Relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
- The purpose and features of typical types of co-generation systems.

T7 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV

REQUIRED SKILLS AND KNOWLEDGE

equipment associated with substations

T8 Substations, power transformers and reactors encompassing:

- Relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
- Characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling
- Auxiliary equipment used on transformers - function and basic operation of equipment
- Maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault finding procedures
- Description, purpose and characteristics of a reactors

T9 Installation of overhead distribution conductors encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length
- Constructions types and structures for distribution and sub transmission lines
- Types, sizes and characterises of overhead conductors
- Resources for the stringing and maintenance of conductors - types of low and high voltage overhead electrical conductor connections, causes and effects of poor electrical connections, reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors, minimum clearances between overhead conductors and low and high voltage structures
- Techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of low and high voltage conductors

T10 Safe working practices and procedures for the installation of overhead distribution conductors encompassing:

- Limits of approach for personnel, vehicles, mobile plant and elevating work platforms (EWP)
- Requirements of persons prior to making bare hand contact with dead low voltage mains and apparatus
- Requirements of relevant electrical access permits necessary to allow work to be performed on low and high voltage apparatus
- Safe working practices - requirements to enable safe working on conductive poles, procedure to attach an “on-site” earthing device to de-energised low and high voltage overhead circuit

T11 Installation of poles and or structures and hardware encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing poles and associated hardware
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Characteristics and applications of different types of poles and associated hardware
- Techniques for installing poles and associated hardware - types of installation equipment/tools, excavation methods, types of footings/foundations, types of attachments, earthing systems, clearances between conductors, safe methods of erecting and stabling poles and or structures and cross arms
- Techniques for maintenance of poles and associated hardware - stabilisation techniques for unstable poles, methods of strengthen poles, maintenance and replacement of high voltage insulators and cross arms.

T12 Installation of low voltage electrical services encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings types of low voltage overhead services, methods of construction and installation, minimum clearances for overhead services to assets and structures, types of installation equipment/tools
- Characteristics and applications of different types of cables - cable cross-sectional area of conductors, current rating and fuse type
- Techniques for maintenance of service installations - diagnosis and repair of faults
- Jointing and terminating methods - polymeric heat shrink materials, polymeric tape materials, energised and de-energised cables, connections to fuse boxes and pole top boxes
- Testing and commissioning procedures – inspection, polarity, voltage and phase sequence tests
- Construction types and structures for distribution and sub transmission lines
- Types, sizes and characteristics of overhead conductors
- Resources for the stringing and maintenance of conductors, - types of low and high voltage overhead electrical conductor connections, causes and effects of poor electrical connections, reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors, minimum clearances between overhead conductors and low and high voltage structures
- Techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of low and high voltage conductors

T13 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering

REQUIRED SKILLS AND KNOWLEDGE

different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors

- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker's body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair
- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

Evidence Guide

EVIDENCE GUIDE

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Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that

can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated

within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Install and maintain any three of the following:	Fuse switches Dropout fuses Sectionalisers Disconnectors Links Fuses Surge arrestors
B	Install and maintain any one of the following:	Reclosers Motorised switches Gas filled switches

		Ring main units Line fault indicators Oil filled switches Air break switches
C	Install and maintain any one of the following:	Transformers Reactors Regulators Capacitors Relays Line fault indicators
D	With regards to the above incorporate any three of the following:	Voltage detectors Phasing equipment Clip-on ammeters Insulation resistance testers Recording meters Earth resistance tester
E	At least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to undertake actual installation and maintenance of network infrastructure electrical equipment

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation, termination/connection and maintenance of overhead electrical equipment relevant to the transmission, distribution and rail networks, and includes pre-commissioning.

Maintenance may include the removal, repair and replacement of electrical equipment encompassing “like for like” and associated hardware as well as the termination and/or connection of this equipment according to requirements and may include sampling of insulating oils. It also encompasses the identification of faults; the pre-commissioning tests involving the equipment/system and the interpretation of these tests against agreed specifications. It excludes the energisation of the equipment maintained in a highly complex, interdependent and interconnected electricity supply Network system, where the affects of unintended consequences on the system are high risk and appropriate personnel effect energisation.

Electrical equipment and associated hardware may include relevant transmission or distribution linework/network; switchgear (e.g. reclosers, sectionalisers, drop-out fuses, disconnectors, isolators, air break switches, gas filled switches, links, fuses, fuse switches and circuit breakers); transformers (e.g. padmount, pole-mounted and mobile); reactors; fault indicators; regulators; street lighting control points; capacitors; cables; underground/overhead cable terminations; relays (simple); mobile generators and surge arrestors; support brackets and the like.

It does not include the energisation of equipment in a highly complex, interdependent and interconnected electricity supply Network system, where the affects of unintended consequences on the system are high risk and appropriate personnel effect energisation.

Test and recording equipment includes voltage detectors, phasing equipment, tong ammeters, voltmeters, recording meters and insulation resistance testers used for the purposes as intended and according to requirements, and does not include use of such in energising installed equipment in a highly complex, interdependent and interconnected electricity supply Network system, where the affects of unintended consequences on the system are high risk.

Equipment may include Pump, filter press, hoses, pipes, soil kits, sample bottles, storage vessels etc.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform

RANGE STATEMENT

- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Industry Specific Cross-Discipline Units

UETTD RIS47A Sample, test, filter and reinstate insulating oil

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the filtering, sampling, testing and reinstating of insulating oil. This may include the dispatching of oil samples to a laboratory for higher level testing if required. Post operational servicing of equipment and or plant and, the identification of any related environment issues concerning disposal, safety and the like are also associated with this unit.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

License to practice**3)**

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG101A	Solve problems in electromagnetic

Prerequisite Unit(s)	4)	
		devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDREL16A	Working safely near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to sample, test, filter and reinstating insulating oil	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for sampling, testing, filtering and reinstating insulating oil are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS and environmental risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p>

ELEMENT	PERFORMANCE CRITERIA
1.8	Relevant personnel at worksite are confirmed current in rescue, release, CPR, pole top rescue and other related work procedures according to requirements.
1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
1.12	Traffic management plan is identified and implemented.
2 Carry out sampling, testing, filtering and reinstating of insulating oil	2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.3 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.4 Essential knowledge and associated skills are applied for the safe sampling, testing, filtering and reinstating of insulating oil are applied to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste

ELEMENT	PERFORMANCE CRITERIA
	according to requirements.
	2.5 Sampling, testing, filtering and reinstating of the insulating oil is carried out, in accordance with the work schedule and to requirements and or established procedures.
	2.6 Unplanned events in the filtering, sampling and testing of insulating oil are undertaken within the scope of established procedures.
	2.7 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.8 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the sampling, testing, filtering and reinstating of insulating oil	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, equipment is returned to service in accordance with requirements.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of sampling, testing, filtering and reinstatement of insulating oil.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS47A Insulating oil - sample, test, filter

Evidence shall show an understanding of the sampling, testing and filtering insulating oil to an extent indicated by the following aspects:

T1 Filtering and sampling of insulating oil encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with filtering and sampling such as - safe handling procedures, personal hygiene, storage and disposal procedures, Occupational Health and Safety hazards and precautions including use of appropriate personal protective equipment, environmental procedures, effects of contaminants.
- Properties of insulating oil - dielectric strength, moisture content, acidity, sludge.
- Locations where insulating oil is used - transformer, switchgear and oil filled cable.
- Filtering equipment – types, cleaning procedures, method of use.
- Techniques in filtering and sampling insulating oil - methods of sampling, methods of filtering, testing procedures on site, analysing oil effectiveness.
- Frequency of testing

T2 Testing of insulating oil encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with testing such as - precautions during testing, types of testing equipment,
- Techniques in testing insulating oil - electric strength, water content, dielectric dissipation, resistivity, acidity
- Brief introduction to Dissolved Gas Analysis(DGA)

T3 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker's body belt, application of

REQUIRED SKILLS AND KNOWLEDGE

knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair

- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

T4 Material handling and the environment encompassing:

- Methods of obtaining updated environmental information and data sheets on the proper use and handling of equipment and materials
- Environmental standards, codes, environmental legislation, OHS legislation, hazardous substances/dangerous goods regulations, supply authority regulations and or enterprise requirements applicable environmental care when handling materials including provision of manufacturers and suppliers information such as material safety data sheets (MSDS)
- Types and application of personal protective equipment used for hazards substances
- Types and application of personal protective equipment used for hazards substances and dangerous goods
- Techniques in handling equipment to eliminate/reduce risks to the environment from spillages of oils, herbicides, pesticides and chemicals from such equipment - vehicle loading crane, chainsaw, enterprise vehicles, explosive power tools
- Procedures for handling and control of spillages of herbicides
- Methods of disposing and storage of herbicides, pesticides and chemicals
- Methods of cleaning mobile plant, equipment and tools
- Recording of data

T5 Environmental issues when undertaking sampling and filtering of oil encompassing:

- Environmental standards, codes, environmental legislation, supply authority regulations and or enterprise requirements applicable to the work to be undertaken

REQUIRED SKILLS AND KNOWLEDGE

- Methods of obtaining updated environmental information and data sheets on the proper use and handling of oil used on transformers and switchgear including provision of MSDS
- Techniques in filtering and sampling oil to eliminate/reduce risks to the environment from spillages
- Safety procedures and equipment for handling and control of the oil
- Methods of disposing and storage of the oil
- Methods of cleaning equipment, tools and equipment
- Emergency procedures for spillages of oil to reduce risks to the environment - methods of cleaning up excessive spillages, methods of protection to surrounding environment, procedure for notification of relevant personnel and authorities, recording procedures.
- PCB contamination, handling and disposal procedures

T6 Safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants encompassing:

- Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the handling and disposing of insulation or heat dissipation materials used in power distribution devices
- Identification of environmental issues associated with the handling and disposing of insulation materials
- Safety precautions when handling and disposing of heat dissipation materials
- Safe working practices
- Occupational Health and Safety hazards and precautions
- Identification of hazards, assessing and controlling risks
- Types, selection, maintenance and uses of personnel protective equipment
- Permit to work systems and isolation procedures
- Types and function of specialised equipment
- Safe working practices when using specialised equipment
- Emergency response and rescue including First Aid etc
- Techniques in the handling and disposing of insulation materials - Polychlorinated Bi-Phenyls (PCB's), asbestos, insulating Oil, SF6 gas.

T7 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation,

REQUIRED SKILLS AND KNOWLEDGE

complaint and issues procedures.

- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion
- T8 Enterprises specific — OHS instructions encompassing:
- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
 - Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
 - Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
 - Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
 - OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
 - OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records
- T9 Enterprises specific — technical drawing and documents encompassing:
- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
 - Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
 - Title box - description of parts and version control
- T10 Enterprises specific specialised tools encompassing:
- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools - voltage detectors; polarity testers, phase rotation.
 - Characteristics, capabilities and application of specialised tools for a particular job
 - Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
 - Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
 - Techniques in pre-use inspection on the serviceability of specialised tools
 - Techniques in the selection, use, maintenance, and care and storage of specialised tools
 - Identifying OHS hazards, assessing and controlling risks associated with their use

REQUIRED SKILLS AND KNOWLEDGE

- Techniques for the safe use of specialised power tools

T11 Substation safety practices encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to substation safety practices
- Techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
- Requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from energised conductors
- Requirements for climbing and working at heights in substations - attached climbing principles, selection, use and operation of elevated work platforms and any OHS requirements associated with the use of EWPs
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
- Control of oil spills - identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
- Rescue and release procedures - rescue personnel from energised conductors, emergency descent from an EWP and may include rescue from confined spaces
- Enterprise requirements - safe access and Authorisation to Work procedures, use of mobile extendable equipment on or near energised HV conductors, emergency response procedures, hazards associated with work in substations including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, dangers of near approach to energised conductors.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least two of the following:	Tx Main Tank. Tx Tap Changer Switchgear Cable Reactor
B	At least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual sampling, testing, filtering and reinstatement of insulating oils.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the filtering, sampling and testing of transformers, switchgear and cable insulating oil and may include tests for dielectric strength and moisture.

Equipment may include (pump) filter press, hoses, pipes, soil kits, sample bottles, storage vessels etc.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS48A Develop high voltage switching schedule

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the preparation of a basic switching schedule for interconnected HV network plant. It includes planning basic outages and taking into account loading of network components. It also includes the calculation of network loading conditions to ensure the network is operating within designed parameters.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government

License to practice**3)**

legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Electrical

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic

Prerequisite Unit(s)	4)	
		devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDNIS44A	Perform HV field switching operation to a given schedule
Transmission Overhead Pathway Group		
	Unit Code	Unit Title
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDRTTP26A	Install transmission structures and associated hardware
	UETTDRTTP27A	Maintain transmission structures and associated hardware
	UETTDRTTP29A	Install and maintain transmission overhead conductors and cables
Distribution Overhead Pathway Group		
	Unit Code	Unit Title
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDTRDP12A	Maintain overhead energised low voltage conductors and cables
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus

Prerequisite Unit(s)	4)	
	UETTDNIS41A	Install network infrastructure electrical equipment
	UETTDNIS42A	Maintain network infrastructure electrical equipment
	UETTDNIS52A	Install and maintain poles, structures and associated hardware
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDNIS56A	Install and maintain low voltage overhead services
	Rail Traction Pathway Group	
	Unit Code	Unit Title
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDNIS52A	Install and maintain poles, structures and associated hardware
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDNRRT21A	Install traction overhead wiring systems
	UETTDNRRT22A	Maintain traction overhead wiring systems
	UETTDNRRT23A	Install rail traction bonds
	UETTDNRRT27A	Install overhead traction components and equipment
	UETTDNRRT28A	Maintain overhead traction components and equipment

Prerequisite Unit(s)**4)**

Distribution Cable Jointing Pathway Group

Unit Code	Unit Title
UETTDRCJ21A	Lay ESI electrical cables
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDNIS41A	Install network infrastructure electrical equipment
UETTDNIS42A	Maintain network infrastructure electrical equipment
UETTDNIS55A	Install and maintain low voltage underground services

Electrical Pathway Group

Unit Code	Unit Title
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical

Prerequisite Unit(s)	4)	installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDRIS67A	Solve problems in energy supply network equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to develop HV switching schedules	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.</p> <p>1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.</p> <p>1.3 Risk control measures are identified, prioritised and evaluated against the work schedule.</p> <p>1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.</p> <p>1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working</p>

ELEMENT	PERFORMANCE CRITERIA
	order.
	1.8 Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
	1.9 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
	1.10 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
2 Carry out the development of HV switching schedules	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
	2.2 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.3 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
	2.4 Development of HV switching schedules is carried out, in accordance with the work schedule and requirements and/or established procedures.
	2.5 Essential knowledge and associated skills are applied in the safe development of HV switching schedules to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.6 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.

ELEMENT	PERFORMANCE CRITERIA
	2.7 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
3 Complete development of HV switching schedules	3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
	3.3 Ensure Relevant work permit(s) are signed off and plant is returned to service and advised to client/customer in accordance with requirements.
	3.4 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing an HV switching schedule.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS48A High voltage switching schedules

Evidence shall show an understanding of developing high voltage switching schedules to an extent indicated by the following aspects:

T1 Electrical equipment fundamentals used in the powerline industry encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment - HV and LV equipment
- Characteristics, capabilities and application of powerline electrical equipment
- Safety precautions with regards to using electrical equipment
- Techniques in pre-use inspection on the serviceability of electrical equipment
- Techniques in the general maintenance, and care and storage of electrical equipment
- Identifying hazards, assessing and controlling risks associated with their the use of electrical equipment

T2 High voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, network interconnectors source of possible backfeed
- Role of the HV switching operator
- Operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- Types and categories of HV switchgear
- Application, function and operating capabilities of switchgear
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV transmission main and working earths
- Earthing HV electrical apparatus practices and procedures for access - purposes of

REQUIRED SKILLS AND KNOWLEDGE

“Operational” and additional work part “on-site” earths, factors determining the location and effectiveness of “Operational” earthing, acceptable industry procedures, personal protective equipment, high voltage switching techniques.

- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T3 High voltage distribution transformer principles encompassing:

- Operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer — cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution transformer and associated electrical apparatus faults.
- HV underground switching equipment - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers.

T4 High voltage SWER system encompassing:

- Application and function of SWER system components
- Circuit arrangement
- Principle of operation
- Hazards and procedures associated with faulty SWER earth systems
- Procedure to isolate, energise and commission SWER substations

T5 Feeder automation system encompassing:

- Function of feeder automation system and the main components
- Operation procedure for a remote field device from a local control station
- Functions of “System Control and Data Acquisition” (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components
- SCADA system security interlocks and access restrictions
- SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciated System and Local Control Station
- Function of the main components of a local/remote control system
- Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciated System and Local Control Station.

T6 HV system switching principles including switching authorisation procedures encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of HV systems and equipment to be switched

REQUIRED SKILLS AND KNOWLEDGE

- Procedures for obtaining correct HV switching authorisation - identification of OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching, procedures for coordination of operations.
- Techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, emergency fault procedures, energisation procedures.

T7 HV overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to HV overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment.
- Role and responsibilities of the HV switching operator
- Operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- HV switchgear – types, categories, application, operating capabilities.
- Operation of HV overhead switching or indicating devices - fuses; disconnect fuses; load switching; live line indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing sticks; phasing tester
- Operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing; HV switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T8 Preparation of a HV switching instruction schedule encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching instruction schedules
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, points of isolation and earthing locations (safety and working earths), responsibilities of the switching operator.

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures.

T9 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T10 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T11 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control

T12 Enterprise specific switching diagrams and drawing encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills;

and

- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Approvals/clearances Access authorities
B	At least one of the following:	Development of an interconnected switching schedule Development of a radial switching schedule
C	All of the following:	Planning of loading of network components, including standby generation. Evaluate load parameters and effects on system, including paralleling and off-loading. Identify unexpected sources of energisation, e.g. generators, UPS, etc. Implementing earthing procedures to reduce induced voltages. Authorising issuance of work-permits.

D	At least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual development of HV switching schedules.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDNIS49A Develop low voltage switching schedule

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the development of HV switching schedules and include the use of system diagrams, data schedules, system loading data and use of computer based systems.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Industry Specific Cross-Discipline Units

UETTDRIS49A Develop low voltage switching schedule

Modification History

Release	Action	Core/Elective	Details	Points
2	Update	N/A	Amend performance criteria from 3.3 to 3.4 to continue sequential numbering.	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the preparation of a basic switching schedule for LV network. It includes planning basic outages and taking into account loading of network components. It also includes the calculation of network loading conditions to ensure the network is operating within design parameters.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice**3)**

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Electrical

Common Unit Group

Unit Code

Unit Title

UEENEEE101A

Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A

Fabricate, assemble and dismantle utilities industry components

UEENEEE104A

Solve problems in d.c. Circuits

UEENEEE105A

Fix and secure electrotechnology

Prerequisite Unit(s)	4)	
		equipment
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDNIS43A	Perform low voltage field switching operation to a given schedule.
Transmission Overhead Pathway Group		
	Unit Code	Unit Title
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTD RTP26A	Install transmission structures and associated hardware
	UETTD RTP27A	Maintain transmission structures and associated hardware
	UETTD RTP29A	Install and maintain transmission overhead conductors and cables
Distribution Overhead Pathway Group		
	Unit Code	Unit Title
	UETTDREL11A	Apply sustainable energy and environmental procedures

Prerequisite Unit(s)**4)**

UETTDNDP12A	Maintain overhead energised low voltage conductors and cables
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDNIS41A	Install network infrastructure electrical equipment
UETTDNIS42A	Maintain network infrastructure electrical equipment
UETTDNIS52A	Install and maintain poles, structures and associated hardware
UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDNIS56A	Install and maintain low voltage overhead services

Rail Traction Pathway Group

Unit Code	Unit Title
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDNIS52A	Install and maintain poles, structures and associated hardware
UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDNRT21A	Install traction overhead wiring systems
UETTDNRT22A	Maintain traction overhead wiring systems

Prerequisite Unit(s)**4)**

UETDRRT23A	Install rail traction bonds
UETDRRT27A	Install overhead traction components and equipment
UETDRRT28A	Maintain overhead traction components and equipment

Distribution Cable Jointing Pathway Group

Unit Code	Unit Title
UETDREL11A	Apply sustainable energy and environmental procedures
UETDRCJ21A	Lay ESI electrical cables
UETDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
UETDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
UETDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETDRIS41A	Install network infrastructure electrical equipment
UETDRIS42A	Maintain network infrastructure electrical equipment
UETDRIS55A	Install and maintain low voltage underground services

Electrical Pathway Group

Unit Code	Unit Title
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines

Prerequisite Unit(s)	4)	
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDNIS67A	Solve problems in energy supply network equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged

Employability Skills

5)

will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Prepare/plan to develop LV switching schedules	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.
		1.2	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
		1.3	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.4	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
		1.5	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.

ELEMENT	PERFORMANCE CRITERIA
1.6	Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order
1.7	Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
1.8	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
2 Carry out the development of LV switching schedules	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
	2.2 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.3 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
	2.4 Development of LV switching schedules is carried out, in accordance with the work schedule and requirements and/or established procedures.
	2.5 Essential knowledge and associated skills are applied in the safe development of LV switching schedules to ensure completion in an agreed timeframe and, to quality standards with

ELEMENT	PERFORMANCE CRITERIA
	a minimum of waste according to requirements.
	2.6 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.7 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
3 Complete development of LV switching schedules	3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Relevant work permit(s) are signed off and, plant is returned to service and advised to client/customer in accordance with requirements.
	3.3 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
	3.4 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing LV switching schedule.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS49A Low voltage switching schedules

Evidence shall show an understanding of developing low voltage switching schedules to an extent indicated by the following aspects:

T1 Electrical equipment fundamentals used in the powerline industry encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment - HV and LV equipment
- Characteristics, capabilities and application of powerline electrical equipment
- Safety precautions with regards to using electrical equipment
- Techniques in pre-use inspection on the serviceability of electrical equipment
- Techniques in the general maintenance, and care and storage of electrical equipment
- Identifying hazards, assessing and controlling risks associated with their the use of electrical equipment

T2 Installation of switchgear and associated equipment encompassing:

- Types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques
- Types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- Installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques, pole mounted locations
- Maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry standards and procedures,
- Testing and commissioning - electricity supply industry standards and procedures

T3 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types,

REQUIRED SKILLS AND KNOWLEDGE

characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed

- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

T4 LV system switching principles including switching authorisation procedures encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of LV systems and equipment to be switched
- Procedures for obtaining correct LV switching authorisation - identification of OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching, procedures for coordination of operations.
- Techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures, energisation procedures

T5 Low voltage overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to low voltage overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment, role and responsibilities of the LV switching operator.
- Operational forms, access authorities and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.
- Use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- LV switchgear – types, categories, application, operating capabilities
- Operation of LV overhead switching or indicating devices - fuses; disconnect fuses; load switching; underslung links, air break switches; disconnects; live line clamps; phasing sticks; phasing tester.
- Operation of protection systems and substation equipment - fault levels and settings; types and applications, protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to LV switching equipment

REQUIRED SKILLS AND KNOWLEDGE

- Procedures for the isolation of LV distributions main and working earths
- Earthing LV electrical apparatus practices and procedures for access authority issuing
- Low voltage switching techniques
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T6 Preparation of a LV switching instruction encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching sheet schedules
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, isolation points and earthing, responsibilities of the switching operator.
- Techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures.

T7 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T8 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation

REQUIRED SKILLS AND KNOWLEDGE

- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records
- T9 Enterprises specific — technical drawing and documents encompassing:
- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
 - Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
 - Title box - description of parts and version control

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place,

access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a

- percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Approvals/clearances Access authorities
B	All of the following:	Development of LV switching schedule to enterprise requirements
C	All of the following	Planning of loading of network components, including standby generation. Evaluate load parameters and effects on system, including paralleling and off-loading. Identify unexpected sources of energisation, e.g. generators, UPS, solar, etc. Implementing earthing procedures to reduce induced voltages. Authorising issuance of work-permits.
D	At least one	Dealing with an

	occasion:	unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual development of LV switching schedules.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDNIS48A Develop high voltage switching schedule

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the development of a LV switching schedule and may include system diagram, system plant data and loading evaluation of network components.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Assessing risk
- Assessment
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDNIS50A Coordinate power system permit procedures

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the coordination of work procedures that require the issue of electrical permits to work and other permits for working on major parts of the electrical network. It encompasses the analysis and coordination of all work activities planned to be undertaken within more or less the same timeframe to ensure that: the organisation's work safety and statutory requirements are complied with; the extent of power interruption, and hence inconvenience to customers, is minimised; and the effective utilisation of available resources, both from the organisation and from its contractors to ensure all planned activities are timely completed to specified standards and requirements.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place

License to practice**3)**

subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Electrical

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits

Prerequisite Unit(s)	4)	
	UEENEEE105A	Fix and secure electrotechnology equipment
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL16A	Working safely near live electrical apparatus
	Transmission Overhead Pathway Group	
	Unit Code	Unit Title
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDRI544A	Perform HV field switching operation to a given schedule
	UETTDRI54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDRT26A	Install transmission structures and associated hardware
	UETTDRT27A	Maintain transmission structures and associated hardware
	UETTDRT29A	Install and maintain transmission overhead conductors and cables
	Distribution Overhead Pathway Group	
	Unit Code	Unit Title
	UETTDREL11A	Apply sustainable energy and environmental procedures

Prerequisite Unit(s)	4)	
	UETTDSDP12A	Maintain overhead energised low voltage conductors and cables
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDRI41A	Install network infrastructure electrical equipment
	UETTDRI42A	Maintain network infrastructure electrical equipment
	UETTDRI43A	Perform low voltage field switching operation to a given schedule.
	UETTDRI52A	Install and maintain poles, structures and associated hardware
	UETTDRI54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDRI56A	Install and maintain low voltage overhead services
	Rail Traction Pathway Group	
	Unit Code	Unit Title
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDRI52A	Install and maintain poles, structures and associated hardware
	UETTDRI54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDRT21A	Install traction overhead wiring systems

Prerequisite Unit(s)	4)	
	UETTDRRT22A	Maintain traction overhead wiring systems
	UETTDRRT23A	Install rail traction bonds
	UETTDRRT27A	Install overhead traction components and equipment
	UETTDRRT28A	Maintain overhead traction components and equipment
	UETTDRRT30A	Perform to a given schedule rail traction switching operations
	Distribution Cable Jointing Pathway Group	
	Unit Code	Unit Title
	UETTDRCJ21A	Lay ESI electrical cables
	UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
	UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDRI541A	Install network infrastructure electrical equipment
	UETTDRI542A	Maintain network infrastructure electrical equipment
	UETTDRI543A	Perform low voltage field switching operation to a given schedule.
	UETTDRI55A	Install and maintain low voltage underground services
	Electrical Pathway Group	

Prerequisite Unit(s)**4)**

Unit Code

Unit Title

UEENEEE137A

Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A

Solve problems in single and three phase low voltage machines

UEENEEG033A

Solve problems in single and three phase electrical apparatus and circuits

UEENEEG063A

Arrange circuits, control and protection for general electrical installations

UEENEEG106A

Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A

Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A

Develop and connect electrical control circuits

UEENEEK142A

Apply environmentally and sustainable energy procedures in the energy sector

UETTDRIS67A

Solve problems in energy supply network equipment

UETTDRSB39A

Perform power system substation switching operation to a given schedule

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|--|-----|--|
| 1 | Prepare/plan to coordinate permit procedures | 1.1 | Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination. |
| | | 1.2 | Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures. |
| | | 1.3 | Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites. |

ELEMENT**PERFORMANCE CRITERIA**

- | | | |
|---|--|---|
| | 1.4 | Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures. |
| | 1.5 | Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures. |
| | 1.6 | Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and applied in the coordination of permit procedures according to established procedures. |
| | 1.7 | Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements. |
| | 1.8 | Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work. |
| 2 | Carry out the co-ordination of permit procedures | |
| | 2.1 | OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures. |
| | 2.2 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| | 2.3 | Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures. |
| | 2.4 | Co-ordination of permit procedures is carried out, in accordance with the work schedule and requirements and/or established procedures. |
| | 2.5 | Essential knowledge and associated skills are |

ELEMENT	PERFORMANCE CRITERIA
	applied in the safe co-ordination of permit procedures to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.6 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.7 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
3 Complete the co-ordination of permit procedures	3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Relevant work permit(s) are signed off and, plant is returned to service and advised to client/customer in accordance with requirements.
	3.3 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
	3.4 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of coordinating permit procedures.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS50A Power system permit procedures

Evidence shall show an understanding of the coordination of power system permit procedures to an extent indicated by the following aspects:

T1 Co-ordinating access authority procedures encompassing:

- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and co-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
- Techniques in facilitating and co-ordinating the delivery and issuing of access authorities
- Techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific work site, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, regulatory requirements such as Occupational Health and Safety and electrical safety.
- Techniques in the receiving and co-ordinating the cancellation of access authorities in readiness for restoration
- Methods of conducting audits on correct access authority procedures
- Process of issuing of other access authorities for work permits - working in confined space, if required, co-ordination of access authorities, engaging and briefing contractors on electrical and other work
- Issue and receipt of operating agreements

T2 High voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, network interconnectors source of possible backfeed
- Role of the HV switching operator
- Operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure

Approved for operational forms, access authorities and permits.

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Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment

instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables

Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	<p>Development of a permit schedule and/or permit issuing procedures.</p> <p>Facilitate and coordinate the delivery and issuing of permits.</p>
B	Gather, collate and confirm data on different worksites relevant to:	<p>Electrical network diagrams for the specific work site.</p> <p>Earth permits.</p> <p>Safe working area.</p> <p>Work to be carried out in confined space or in hazardous environment.</p> <p>Specific outsourcing procedures.</p> <p>Specific hazard identification</p> <p>Risk classification and management procedures.</p> <p>Regulatory requirements such as Occupational Health and Safety and electrical safety.</p>
C	All of the following:	<p>Receive and coordinate the cancellation of permits in readiness for restoration.</p> <p>Conduct audits permit correctness procedures.</p>
D	At least two of the following:	Issue of other work permits such as working in confined

		space, if required. Co-ordination of permits. Engaging and briefing contractors on electrical and other work permits.
E	At Least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual coordinate permit procedures.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit

applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the coordination of permit procedures and may include but not be limited to the following.

Enterprise/organisational specific co-ordination could involve:

Electrical network diagrams, electrical permit to work system, other work permit system such as work in confined space or in hazardous environment, outsourcing procedures, hazard identification, risk classification and management procedures.

Regulatory requirements include Occupational Health and Safety and electrical safety

Computer based systems can be used in the generation of work schedules, programs and/or resource allocation.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Assessing risk
- Assessment
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Requirements
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDNIS51A Coordinate and direct power system switching schedules

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the co-ordination and direction of switching the HV and LV system. It includes coordinating switching between operating authorities and HV customers, etc. It also includes the direction of switching on the HV and LV electrical network.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

License to practice**3)**

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Electrical

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Prerequisite Unit(s)**4)**

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. Circuits

UETTDREL16A Working safely near live electrical apparatus

Transmission Overhead Pathway Group

Unit Code	Unit Title
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UETTDREL11A	Apply sustainable energy and environmental procedures
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UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
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UETTDRI544A	Perform HV field switching operation to a given schedule
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UETTDRI54A	Install and maintain poles, structures, overhead conductors and cables
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UETTDRT26A	Install transmission structures and associated hardware
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UETTDRT27A	Maintain transmission structures and associated hardware
------------	--

UETTDRT29A	Install and maintain transmission overhead conductors and cables
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Distribution Overhead Pathway Group

Unit Code	Unit Title
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UETTDREL11A	Apply sustainable energy and environmental procedures
-------------	---

UETTDRE12A	Maintain overhead energised low voltage conductors and cables
------------	---

UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
-------------	---

Prerequisite Unit(s)	4)	
	UETTDRIS41A	Install network infrastructure electrical equipment
	UETTDRIS42A	Maintain network infrastructure electrical equipment
	UETTDRIS43A	Perform low voltage field switching operation to a given schedule.
	UETTDRIS52A	Install and maintain poles, structures and associated hardware
	UETTDRIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDRIS56A	Install and maintain low voltage overhead services
	Rail Traction Pathway Group	
	Unit Code	Unit Title
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDRIS52A	Install and maintain poles, structures and associated hardware
	UETTDRIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDRRT21A	Install traction overhead wiring systems
	UETTDRRT22A	Maintain traction overhead wiring systems
	UETTDRRT23A	Install rail traction bonds
	UETTDRRT27A	Install overhead traction components and equipment
	UETTDRRT28A	Maintain overhead traction components and equipment

Prerequisite Unit(s)**4)**

UETTDRT30A	Perform to a given schedule rail traction switching operations
Distribution Cable Jointing Pathway Group	
Unit Code	Unit Title
UETTDRCJ21A	Lay ESI electrical cables
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDRI541A	Install network infrastructure electrical equipment
UETTDRI542A	Maintain network infrastructure electrical equipment
UETTDRI543A	Perform low voltage field switching operation to a given schedule.
UETTDRI55A	Install and maintain low voltage underground services
Electrical Pathway Group	
Unit Code	Unit Title
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three

Prerequisite Unit(s)	4)	phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDRIS67A	Solve problems in energy supply network equipment
	UETTDRSB39A	Perform power system substation switching operation to a given schedule

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the

Employability Skills

5)

qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Prepare/plan to coordinate and direct switching schedules	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.
		1.2	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
		1.3	Risk control measures are identified, prioritised and evaluated against the work schedule.
		1.4	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
		1.6	Relevant work permits are secured to coordinate the performance of work according to

ELEMENT**PERFORMANCE CRITERIA**

- requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
- 1.8 Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 2 Carry out coordinate and direct switching schedules
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
- 2.2 First Aid, Pole Top Rescue and other related work procedures are performed according to requirements and/or established procedures.
- 2.3 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.
- 2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
- 2.6 Coordination and direction of switching schedules is carried out, in accordance with the work schedule and requirements and/or established procedures.

ELEMENT**PERFORMANCE CRITERIA**

- | | | | |
|---|--|-----|--|
| 3 | Complete coordinate and direct switching schedules | 2.7 | Essential knowledge and associated skills are applied in the safe the coordination and direction of switching schedules to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements. |
| | | 2.8 | Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements. |
| | | 2.9 | Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard. |
| | | 3.1 | Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures. |
| | | 3.2 | Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures. |
| | | 3.3 | Relevant work permit(s) are signed off and electrical plant is returned to service and advise to client/customer in accordance with requirements. |
| | | 3.4 | Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of coordinating and directing switching schedules.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS51A Power system switching schedules

Evidence shall show an understanding of the coordinating and directing power system switching schedules to an extent indicated by the following aspects:

T1 Electrical equipment fundamentals used in the powerline industry encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment - HV and LV equipment
- Characteristics, capabilities and application of powerline electrical equipment
- Safety precautions with regards to using electrical equipment
- Techniques in pre-use inspection on the serviceability of electrical equipment
- Techniques in the general maintenance, and care and storage of electrical equipment
- Identifying hazards, assessing and controlling risks associated with their the use of electrical equipment

T2 Installation of switchgear and associated equipment encompassing:

- Types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques
- Types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- Installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques, pole mounted locations
- Maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry standards and procedures,
- Testing and commissioning - electricity supply industry standards and procedures

T3 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types,

REQUIRED SKILLS AND KNOWLEDGE

characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed

- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

T4 High voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, network interconnectors source of possible backfeed
- Role of the HV switching operator
- Operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- Types and categories of HV switchgear
- Application, function and operating capabilities of switchgear
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV transmission main and working earths
- Earthing HV electrical apparatus practices and procedures for access - purposes of “Operational” and additional work part “on-site” earths, factors determining the location and effectiveness of “Operational” earthing, acceptable industry procedures, personal protective equipment, high voltage switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T5 High voltage distribution transformer principles encompassing:

- Operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer — cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution transformer and associated electrical apparatus faults.
- HV underground switching equipment - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers.

REQUIRED SKILLS AND KNOWLEDGE

T6 High voltage SWER system encompassing:

- Application and function of SWER system components
- Circuit arrangement
- Principle of operation
- Hazards and procedures associated with faulty SWER earth systems
- Procedure to isolate, energise and commission SWER substations

T7 Feeder automation system encompassing:

- Function of feeder automation system and the main components
- Operation procedure for a remote field device from a local control station
- Functions of “System Control and Data Acquisition” (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components
- SCADA system security interlocks and access restrictions
- SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciated System and Local Control Station
- Function of the main components of a local/remote control system
- Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciated System and Local Control Station.

T8 HV system switching principles including switching authorisation procedures encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of HV systems and equipment to be switched
- Procedures for obtaining correct HV switching authorisation - identification of OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching, procedures for coordination of operations.
- Techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, emergency fault procedures, energisation procedures.

T9 LV system switching principles including switching authorisation procedures encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of LV systems and equipment to be switched
- Procedures for obtaining correct LV switching authorisation - identification of OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching

REQUIRED SKILLS AND KNOWLEDGE

resources, procedures for obtaining electrical access permits authorities, requirements for team switching, procedures for coordination of operations.

- Techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures, energisation procedures

T10 Coordinating and directing switching instructions encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching sheet instructions
- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the co-ordination and directing of switching schedules instructions
- Relationship between the operating authorities and HV customers, operating agreements
- Techniques in co-ordinating and directing HV and LV switching of electrical networks
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
- Responsibilities of the switching operator
- Techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures.
- Techniques in gathering, collating and confirming data on switching procedures

T11 HV overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to HV overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment.
- Role and responsibilities of the HV switching operator
- Operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- HV switchgear – types, categories, application, operating capabilities.
- Operation of HV overhead switching or indicating devices - fuses; disconnect

REQUIRED SKILLS AND KNOWLEDGE

fuses; load switching; live line indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing sticks; phasing tester

- Operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing; HV switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T12 Low voltage overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to low voltage overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment, role and responsibilities of the LV switching operator.
- Operational forms, access authorities and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.
- Use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters, arc strangles.
- LV switchgear – types, categories, application, operating capabilities
- Operation of LV overhead switching or indicating devices - fuses; disconnect fuses; load switching; underslung links, air break switches; disconnects; live line clamps; phasing sticks; phasing tester.
- Operation of protection systems and substation equipment - fault levels and settings; types and applications, protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to LV switching equipment
- Procedures for the isolation of LV distributions main and working earths
- Earthing LV electrical apparatus practices and procedures for access authority issuing
- Low voltage switching techniques
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

REQUIRED SKILLS AND KNOWLEDGE

T13 Preparation of a HV switching instruction schedule encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching instruction schedules
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, points of isolation and earthing locations (safety and working earths), responsibilities of the switching operator.
- Techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures.

T14 Preparation of a LV switching instruction encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching sheet schedules
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, isolation points and earthing, responsibilities of the switching operator.
- Techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures.

T15 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T16 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures

REQUIRED SKILLS AND KNOWLEDGE

- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T17 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control

T18 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment,

such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Approvals/clearances Access permits
B	All of the following:	Switching direction Switching co-ordination Autonomy of working with network control
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and

		associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual coordination and direction of switching schedules.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the co-ordination and directing of switching schedules and may include a switching schedule, electrical plans and schematics.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Assessing risk
- Assessment
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Industry Specific Cross-Discipline Units

UETTDRIS52A Install and maintain poles, structures and associated hardware

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of poles and/or structures and associated hardware, other than towers, which may consist of wood, steel, concrete or composite type material. It includes the fixing and or securing of hardware associated as well as the repair and or replacement of poles and or structures used in the distribution and or rail traction industry sectors. It encompasses the implementation of a suitable traffic management plan.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice**3)**

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

- | | | | |
|---|---|-----|---|
| 1 | Prepare for the installation and maintenance of poles and/or structures and associated hardware | 1.1 | Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection. |
| | | 1.2 | Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites. |

ELEMENT**PERFORMANCE CRITERIA**

- 1.3 OHS policies and procedures related to requirements and established procedures the installation and maintenance of poles and/or structures and associated hardware are obtained and confirmed for the purposes of the work to be performed and communicated.
- 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
- 1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.7 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
- 1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA
	1.12 Traffic management plan is identified and implemented.
2 Carry out installation and maintenance of poles and/or structures and associated hardware	2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.3 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.4 Essential knowledge and associated skills are applied in the safe installation of poles and/or structures and their associated hardware to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.5 Poles and/or structures and their associated hardware to be installed are stabilised according to requirements.
	2.6 Installation is carried out, in accordance with the work schedule and requirements/established procedures.
	2.7 Maintenance, including repair and/or replacement of poles and/or structures is carried out, in accordance with the work schedule and requirements/established procedures.
	2.8 Unplanned events in the installation of poles and/or structures and associated hardware are undertaken within the scope of established procedures.
	2.9 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.

ELEMENT	PERFORMANCE CRITERIA
	2.10 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the installation and maintenance of poles and/or structures and associated hardware.	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, poles and/or structures and their associated hardware are returned to service in accordance with requirements.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining poles/structures and associated hardware.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS52A Pole and hardware installation and maintenance

Evidence shall show an understanding of the installation of poles and or structures and hardware to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing poles and associated hardware

T2 Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, encompassing:

- Characteristics and applications of different types of poles and associated hardware

T3 Techniques for installing poles and associated hardware encompassing:

- Types of installation equipment/tools
- Excavation methods
- Types of footings/foundations
- Types of attachments
- Earthing systems
- Clearances between conductors
- Safe methods of erecting and stabling poles and or structures and cross arms

T4 Techniques for maintenance of poles and associated hardware encompassing:

- Stabilisation techniques for unstable poles
- Methods of strengthen poles
- Maintenance and replacement of high voltage insulators and cross arms

T5 Traffic management

- Note: Examples include purpose of traffic management and a power worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio

T6 Procedures for purchasing/ordering items, removing/dispatching items, stocktaking and record keeping

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least one of the following	Wood pole/structure Steel pole/structure Concrete pole/structure Composite pole/structure
B	At least three of the following:	Insulators Cross arm braces Crossarms Pole steps Shackle straps Earth leads Traction supports Traction registration Bonding
C	At least one of the following:	Baulking Stays Concreting including foundation
D	At least one of the following:	Crane Auger/erector 'A' frame Lifting beam Pole pikes Helicopter lift
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation of poles and or structures and their associated hardware.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation of poles and or structures which may include basic inspection, removal, repair and replacement of poles and/or structures, including welding, pole staking and rebutting.

Equipment may include:

Pole types and structures may include wood, concrete, steel and composite.

Maintenance may include the basic inspection, removal, repair and replacement of poles including welding, pole staking and rebutting.

Associated hardware includes insulators, crossarms, stays, earth down leads and bond wires, crossarm braces, pole steps, shackle straps and associated bolts and clamps, cantilever assembly, pull off, head span, portal, drop tube

Pole stabilisation techniques include back-fill consolidation, concreting, baulking, reinforcement nailing, approved steel reinforcing and temporary and permanent stay-wires.

Methods of erection may include crane, auger/erector, winch/'A' frame, lifting apparatus and helicopter lift.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures

RANGE STATEMENT

- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDNIS53A Install and maintain power system public lighting

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation, maintenance and repair of public lighting systems. This also includes the inspection, testing and commissioning of the system associated with the street lighting circuit, the associated hardware and the earthing system. Installation will include the installation of, the associated hardware and components and, the wiring and earthing system. Maintenance may also include work on energised LV overhead or underground public lighting systems including the diagnosis of faults and the updating of relevant system data and or public lighting maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice**3)**

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment

Prerequisite Unit(s)**4)**

UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDREL16A	Working safely near live electrical apparatus

Transmission Overhead Pathway Group

Unit Code	Unit Title
UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTD RTP26A	Install transmission structures and associated hardware
UETTD RTP27A	Maintain transmission structures and associated hardware
UETTD RTP29A	Install and maintain transmission overhead conductors and cables

Distribution Overhead Pathway Group

Unit Code	Unit Title
UETTD RDP12A	Maintain overhead energised low voltage conductors and cables
UETTDNIS41A	Install network infrastructure electrical equipment
UETTDNIS42A	Maintain network infrastructure electrical equipment
UETTDNIS52A	Install and maintain poles, structures

Prerequisite Unit(s)**4)**

and associated hardware

UETTDRIS54A Install and maintain poles, structures, overhead conductors and cables

UETTDRIS56A Install and maintain low voltage overhead services

Rail Traction Pathway Group

Unit Code Unit Title

UETTDRIS52A Install and maintain poles, structures and associated hardware

UETTDRIS54A Install and maintain poles, structures, overhead conductors and cables

UETTDRRT21A Install traction overhead wiring systems

UETTDRRT22A Maintain traction overhead wiring systems

UETTDRRT23A Install rail traction bonds

UETTDRRT27A Install overhead traction components and equipment

UETTDRRT28A Maintain overhead traction components and equipment

Distribution Cable Jointing Pathway Group

Unit Code Unit Title

UETTDRCJ21A Lay ESI electrical cables

UETTDRCJ26A Install and maintain de-energised low voltage underground polymeric cables.

UETTDRCJ27A Install and maintain de-energised high voltage underground polymeric cables.

UETTDRIS41A Install network infrastructure electrical equipment

UETTDRIS42A Maintain network infrastructure

Prerequisite Unit(s) 4)

electrical equipment

UETTDNIS55A Install and maintain low voltage underground services

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the installation and maintenance of public lighting systems	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the installation and maintenance of public lighting systems are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p> <p>1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.</p> <p>1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.</p>

ELEMENT	PERFORMANCE CRITERIA
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.12 Traffic management plan is identified and implemented.
2 Carry out installation and maintenance of public lighting systems	2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Essential knowledge and associated skills are applied in the safe installation and maintenance of public lighting systems to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.4 Excavation/foundation construction is inspected, and confirmed as being in accordance with established procedures.
	2.5 Associated hardware, fittings and control gear are installed as per established procedures.
	2.6 Earthing system and street lighting circuit is installed as per established procedures.
	2.7 Inspection of public lighting and associated hardware is conducted to ascertain that it conforms to requirements/established procedures.
	2.8 Maintenance, including repair and/or replacement

ELEMENT**PERFORMANCE CRITERIA**

- of the public lighting system is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.9 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.10 Unplanned events in the installation and maintenance of public lighting systems are undertaken within the scope of established procedures.
- 2.11 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.12 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 3 Complete the installation and maintenance of public lighting systems
- 3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures
- 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, the public lighting system is returned to service in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining public lighting systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS53A Installation and maintenance of public lighting

Evidence shall show an understanding of procedures for installation and maintenance on public lighting structures and associated equipment to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations, local government and or enterprise requirements pertaining to the installation and maintenance of public lighting systems and associated equipment

T2 Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, encompassing:

- Street lighting circuits
- Earthing system

T3 Types of tools and equipment used for installation and maintenance

T4 Types and function of lanterns/luminaires/lamps, control equipment, poles and associated hardware used for street lighting

- Note: Examples include hp mercury vapour, LP and HP sodium vapour, fluorescent, quartz-halogen, wood, concrete, steel, composite, choke boxes, photo-electric cells, time switches, contactor boxes

T5 Types of lighting systems encompassing:

- Overhead and underground street lighting systems
- Controlling and switching of lighting systems

T6 Techniques for the installation of street lighting systems

T7 Techniques for the maintenance of street lighting systems

- Note: Examples include diagnosing of faults, removing, repairing, replacement and cleaning of public lighting and associated hardware

T8 Application of specific testing equipment

- Note: Examples include voltage detectors, insulation resistance testers, clamp-on ammeters, continuity testers, fault indicators

T9 Techniques for the inspection, testing and commissioning of street lighting systems

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment

instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables

Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least one of the following:	Wood Concrete Steel Composite
B	At least two of the following:	HP mercury vapour, LP and HP sodium vapour Fluorescent Quartz-halogen
C	At least three of the following:	Voltage detectors* Insulation resistance testers Clamp-on ammeters Continuity testers Fault indicators (* must use)
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a

workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of public lighting systems.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

Competency shall be demonstrated in relation to the installation, maintenance and repair of public lighting systems, including the inspection, testing and commissioning of the system associated with the street lighting circuit, the associated hardware and the earthing system.

Maintenance may include the removal, repair, replacement and cleaning of public lighting and associated hardware.

Public lighting system may include lanterns/luminaires, lamps or control equipment in overhead and underground reticulated areas, poles and columns.

Associated hardware may include brackets, choke boxes, photo-electric cells, time switches, contactor boxes and appropriate nuts and bolts.

Testing equipment may include LV detectors and fault indicators.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform.
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect

RANGE STATEMENT

- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS54A Install and maintain poles, structures and overhead conductors and cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of overhead conductors and cables used on poles and structures (excluding towers) which includes the stringing, tensioning and terminating of the conductor/cable, as well as the cleaning of insulators (de-energised), the securing of the conductor to the insulators or supports and the undertaking of the electrical connections. It also covers maintenance work associated with the diagnosing of faults, the conducting of visual inspections, the confirmation of phasing and the completion of other enterprise tests. It also encompasses the isolation of systems and circuits, the procedure of issuing/accepting electrical access permits and the updating of system data/maintenance records according to requirements and established procedures.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Prerequisite Unit(s) 4)

UETTDREL11A Apply sustainable energy and environmental procedures

UETTDREL16A Working safely near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the installation and maintenance of overhead conductors and cables used on poles and/or structures	1.1 Plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 OHS policies and procedures related to requirements and established procedures for the installation and maintenance of overhead conductors and cables used on poles and/or structures are obtained and confirmed for the purposes of the work to be performed and communicated.
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
	1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
	1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|--|---|
| | 1.10 | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures. |
| | 1.11 | Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures. |
| | 1.12 | Traffic management plan is identified and implemented. |
| 2 | Carry out installation and maintenance of overhead conductors and cables used on poles and/or structures | |
| | 2.1 | OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures. |
| | 2.2 | Lifting, climbing, working aloft, rescue and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed. |
| | 2.3 | Confirm systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures. |
| | 2.4 | Essential knowledge and associated skills are applied in the safe installation and maintenance of overhead conductors and cables used on poles and/or structures to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements. |
| | 2.5 | Overhead conductor/cables are strung, tensioned and terminated as per requirements/established procedures. |
| | 2.6 | Insulators are cleaned and conductors and anti-vibration devices, spaces/spreaders are secured as per established procedures. |
| | 2.7 | Electrical connections are made in accordance |

ELEMENT

PERFORMANCE CRITERIA

- with the requirements/established procedures.
- 2.8 Maintenance, including repair and/or replacement of overhead conductors and cables used on poles and/or structures is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.9 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.10 Unplanned events in the installation and maintenance of overhead conductors and cables used on poles and/or structures are undertaken within the scope of established procedures.
- 2.11 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.12 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 3 Complete the installation and maintenance of overhead conductors and cables used on poles and/or structures
- 3.1 Work undertaken is checked against works schedule for confirmation of phasing and conformance with requirements and, anomalies reported in accordance with established procedures.
- 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, overhead conductors and cables used on poles and/or structures are returned to service in

ELEMENT

PERFORMANCE CRITERIA

accordance with requirements.

3.6 Conductors/Cables are tested and commissioned in accordance with enterprise requirements and procedures.

3.7 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining overhead conductors and cables (poles and structures).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS54A Powerline distribution installation

Evidence shall show an understanding of the installation of overhead distribution conductors to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment

T2 Safe work practices encompassing:

- Requirements to enable safe working on conductive poles
- Procedures to attach on site earthing devices to de-energised low voltage and high voltage circuits

T3 Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings, encompassing:

- Material lists
- Conductor size, type and route length

T4 Constructions types and structures for distribution and sub transmission lines

T5 Types, sizes and characterises of overhead conductors

T6 Resources for the stringing and maintenance of conductors, encompassing:

- Types of low and high voltage overhead electrical conductor connections
- Causes and effects of poor electrical connections
- Reasons for and methods used to maintain standard phase sequencing
- Removing, repairing and replacing of damage conductors
- Minimum clearances between overhead conductors and low and high voltage structures

T7 Techniques for conductor installation encompassing:

- Types and application of tools, equipment and hardware
- Methods of stringing, tensioning and termination of low and high voltage conductors

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least two of the following:	Copper Aluminium Steel LV abc Aluminium/steel reinforced HV abc HV iuc Pilot
B	At least two of the following:	EWP Portable platform Ladder
C	At least three of the following:	Tension equipment* Cable drum stands Cable trailers Ropes Rollers Sheaves Stockings Stringing equipment Swivels Winches (* must do one)
D	At least two of the following:	Voltage indicators * Phasing sticks Fault indicators Field intensity meter Operating rods (*must do)
E	Any one of the following:	Lay-out (stringing method) Pull through (stringing

		method) Pilot rope (stringing method)
F	Any one of the following:	Dynamometer Site board Beat (wave sagging) Abney level Theodolite
G	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of overhead conductors and cables on poles and other structures.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of overhead conductors and cables used on poles and structures.

Installation and maintenance may include the stringing, tensioning, terminating of the conductor/cable and the removal, repair and replacement of cables, conductors and associated hardware and includes the cleaning of insulators. May include pre-energised/energisation checks and tests. Visual inspections, diagnosing maintenance work associated with the fault diagnosis, conducting of visual inspections, confirmation of phasing, and the completion of other enterprise tests is also included. It also encompasses the isolation of systems and circuits, the procedure of issuing/accepting electrical access permits and the updating of system data/maintenance records according to requirements and established procedures.

Structures include poles and columns.

Types of conductor include copper, aluminium, steel, aluminium conductor steel reinforced (ACSR), low voltage aerial bundled cable (LVABC), high voltage aerial bundled cable (HVABC), insulated unscreened cable (IUC), service cable and fibre optic, pilot and control cables.

Overhead systems include their associated earthing systems, e.g. MEN and CMEN LV systems, bridging/bonding and conventional and SWER HV systems.

Plant may include elevating work platform, winches and capstans, specialist tension stringing equipment, cable trailers and cable drum stands.

Testing and recording equipment (LV) includes voltage detectors, tong ammeters, polarity testers, insulation resistance testers, recording meters and phase sequence indicators.

Testing and recording equipment (HV) includes phasing sticks, fault indicators, radio frequency interference detectors and voltage detectors.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space

RANGE STATEMENT

- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS55A Install and maintain low voltage underground services

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation, maintenance and connection of low voltage underground service lines and associated equipment (between the connection point and the point of supply - customers' premises). Maintenance includes the repair and replacement of service cables, service fuses and the replacement and repair of service hardware, the identification and rectification of faults. It also covers insulation, voltage, polarity testing and phase rotation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice**3)**

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Electrotechnology Electrician

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment

Prerequisite Unit(s)**4)**

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. Circuits

UETTDREL16A Working safely near live electrical apparatus

Transmission Overhead Pathway Group

Unit Code	Unit Title
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UETTDREL11A	Apply sustainable energy and environmental procedures
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UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
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UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
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UETTD RTP26A	Install transmission structures and associated hardware
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UETTD RTP27A	Maintain transmission structures and associated hardware
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UETTD RTP29A	Install and maintain transmission overhead conductors and cables
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Distribution Overhead Pathway Group

Unit Code	Unit Title
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UETTD RDP12A	Maintain overhead energised low voltage conductors and cables
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UETTDREL11A	Apply sustainable energy and environmental procedures
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UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
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UETTDNIS41A	Install network infrastructure electrical
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Prerequisite Unit(s)**4)**

equipment

UETTDNIS42A Maintain network infrastructure
electrical equipment

UETTDNIS52A Install and maintain poles, structures
and associated hardware

UETTDNIS54A Install and maintain poles, structures,
overhead conductors and cables

UETTDNIS56A Install and maintain low voltage
overhead services

Rail Traction Pathway Group

Unit Code	Unit Title
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UETTDREL11A	Apply sustainable energy and environmental procedures
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UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
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UETTDNIS52A	Install and maintain poles, structures and associated hardware
-------------	---

UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
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UETTDNRRT21A	Install traction overhead wiring systems
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UETTDNRRT22A	Maintain traction overhead wiring systems
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UETTDNRRT23A	Install rail traction bonds
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UETTDNRRT27A	Install overhead traction components and equipment
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UETTDNRRT28A	Maintain overhead traction components and equipment
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Distribution Cable Jointing Pathway Group

Unit Code	Unit Title
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Prerequisite Unit(s)**4)**

- UETTDRCJ21A Lay ESI electrical cables
- UETTDRCJ26A Install and maintain de-energised low voltage underground polymeric cables.
- UETTDRCJ27A Install and maintain de-energised high voltage underground polymeric cables.
- UETTDREL11A Apply sustainable energy and environmental procedures
- UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus

Electrotechnology Electrician Pathway Group

- | Unit Code | Unit Title |
|-------------|---|
| UEENEEE137A | Document and apply measures to control OHS risks associated with electrotechnology work |
| UEENEEG006A | Solve problems in single and three phase low voltage machines |
| UEENEEG033A | Solve problems in single and three phase electrical apparatus and circuits |
| UEENEEG063A | Arrange circuits, control and protection for general electrical installations |
| UEENEEG106A | Terminate cables, cords and accessories for low voltage circuits |
| UEENEEG108A | Trouble-shoot and repair faults in low voltage electrical apparatus and circuits |
| UEENEEG109A | Develop and connect electrical control circuits |
| UEENEEK142A | Apply environmentally and sustainable energy procedures in the energy sector |
| UETTDRI55A | Solve problems in energy supply network equipment |

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1 Prepare for the installation and maintenance of LV underground services and associated equipment	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.

ELEMENT**PERFORMANCE CRITERIA**

- 1.3 OHS policies and procedures related to requirements and established procedures for the installation and maintenance of LV underground services and associated equipment are obtained and confirmed for the purposes of the work to be performed and communicated.
- 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
- 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.8 Relevant personnel at worksite are confirmed current in First Aid, Rescue and other related work procedures according to requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Road signs, barriers and warning devices are

ELEMENT**PERFORMANCE CRITERIA**

ELEMENT	PERFORMANCE CRITERIA
	positioned in accordance with requirements.
2 Carry out installation and maintenance of LV underground services and associated equipment	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.</p> <p>2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.</p> <p>2.3 Essential knowledge and associated skills are applied in the safe installation and maintenance of LV underground services and associated equipment to ensure completion to quality standards with a minimum of waste according to requirements.</p> <p>2.4 LV underground services and associated equipment are installed according to the work schedule and requirements/established procedures.</p> <p>2.5 Maintenance, including repair and/or replacement of LV services and associated equipment is carried out, in accordance with the work schedule and requirements/established procedures.</p> <p>2.6 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.7 Unplanned events during the installation and maintenance of LV services and associated equipment are undertaken within the scope of established procedures.</p> <p>2.8 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.</p> <p>2.9 Ongoing checks of quality of the work are undertaken in accordance with instructions and</p>

ELEMENT	PERFORMANCE CRITERIA
	established procedures.
3 Complete the installation and maintenance of LV underground services and associated equipment	3.1 Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, the LV services and associated equipment are returned to service in accordance with requirements.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining low voltage services (underground).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS55A Low voltage electrical underground service installation

Evidence shall show an understanding of the installation of low voltage electrical services to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements

T2 Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, encompassing:

- Types of low voltage underground services
- Methods of construction and installation
- Minimum depths for underground services to be buried and proximity to other assets and structures

T3 Installation equipment/tools

- Equipment and tools for underground service installation
- Fittings and hardware for underground service installation

T4 Methods of laying cables including:

- Conduits and sand and slabbing

T5 Characteristics and applications of different types of cables encompassing:

- Cable cross-sectional area of conductors
- Current rating and fuse types and ratings

T6 Techniques for maintenance of service installations encompassing:

- Diagnosis and repair of faults

T7 Jointing and terminating methods encompassing:

- Polymeric heat-shrink materials
- Polymeric tape materials
- Insulated piercing connectors (IPCs)
- Energised and de-energised cables
- Connections to point of entry, fuse boxes, pillars, pits

T8 Testing and commissioning procedures encompassing:

- Pre-energising tests - insulation resistance and continuity test

REQUIRED SKILLS AND KNOWLEDGE

- Inspection
- Equipment functionality tests
- Polarity, voltage and phase sequence tests
- Neutral and phase identification tests
- Neutral integrity tests
- Meter function test
- Testing check forms

T9 Connection principles:

- Purpose and function of MEN system
- Types of connection faults
- Causes and effects of incorrect and poor electrical connections
- Principles of loop impedance
- Reasons for and methods used to maintain standard phase sequencing
- Purpose and operation of service fusing
- Use of independent earth for testing

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full

can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least two of the following:	Underground pillar/pit connection (single phase) Underground pillar/pit connection (three phase*) Underground to overhead connection (* must do)
B	At least one of the following:	Fuse units Circuit breakers Service links
C	At least four of the following:	Polarity test * Phase rotation test Continuity test Voltage test Insulation resistance

		test (* must do)
D	At least one of the following:	Aluminium LV cable XLPE cable Copper LV cable
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of underground LV services.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is

expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of underground low voltage services as they relate to distribution circuits and associated equipment and includes the identification of faults.

Installation may include, the laying and connection of service cables, connection of the service cable to underground equipment, the fitting and connection of fuses or circuit breakers and the testing and commissioning of the service

Service includes the connection between the customers' point of supply and the underground pillar/pit connection (single phase), underground pillar/pit connection (three phase) and or underground to overhead connection.

Maintenance may include the identification and diagnosis of faults, the removal, replacement or repair of service cables and associated hardware and the temporary installation of services and associated equipment and the testing and commissioning of the service.

Testing procedures may include continuity, polarity, phase rotation, insulation resistance and voltage.

Testing equipment may include, digital/analogue voltage testers, multimeters, phase rotation testers, load testers, insulation resistance and continuity testers.

Associated hardware may include fuse units, circuit breakers, contactors, mains connection boxes.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures

RANGE STATEMENT

- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS56A Install and maintain low voltage overhead services

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation, maintenance and connection of low voltage overhead service lines and associated equipment (between the connection point and the point of supply - customers' premises). Maintenance includes the repair and replacement of service cables, service fuses and the replacement and repair of service hardware, the identification and rectification of faults. It also covers insulation, voltage, polarity testing and phase rotation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice**3)**

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Electrotechnology Electrician

Common Unit Group

Unit Code

Unit Title

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. Circuits

UEENEEE105A Fix and secure electrotechnology equipment

Prerequisite Unit(s)**4)**

UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits
UETTDREL16A	Working safely near live electrical apparatus

Transmission Overhead Pathway Group

Unit Code	Unit Title
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDRI54A	Install and maintain poles, structures, overhead conductors and cables
UETTD RTP26A	Install transmission structures and associated hardware
UETTD RTP27A	Maintain transmission structures and associated hardware
UETTD RTP29A	Install and maintain transmission overhead conductors and cables

Distribution Overhead Pathway Group

Unit Code	Unit Title
UETTD RDP12A	Maintain overhead energised low voltage conductors and cables
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus

Prerequisite Unit(s)**4)**

UETTDNIS52A Install and maintain poles, structures and associated hardware

UETTDNIS54A Install and maintain poles, structures, overhead conductors and cables

Rail Traction Pathway Group

Unit Code	Unit Title
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UETTDREL11A	Apply sustainable energy and environmental procedures
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UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
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UETTDNIS52A	Install and maintain poles, structures and associated hardware
-------------	--

UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
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UETTDNRRT21A	Install traction overhead wiring systems
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UETTDNRRT22A	Maintain traction overhead wiring systems
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UETTDNRRT23A	Install rail traction bonds
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UETTDNRRT27A	Install overhead traction components and equipment
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UETTDNRRT28A	Maintain overhead traction components and equipment
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Distribution Cable Jointing Pathway Group

Unit Code	Unit Title
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UETTDNRCJ21A	Lay ESI electrical cables
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UETTDNRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
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UETTDNRCJ27A	Install and maintain de-energised
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Prerequisite Unit(s)	4)	high voltage underground polymeric cables.
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDRI541A	Install network infrastructure electrical equipment
	UETTDRI542A	Maintain network infrastructure electrical equipment
	UETTDRI55A	Install and maintain low voltage underground services
	Electrotechnology	Electrician Pathway Group
	Unit Code	Unit Title
	UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and

Prerequisite Unit(s) 4)

sustainable energy procedures in the energy sector

UETTDRIS67A

Solve problems in energy supply network equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the installation and maintenance of LV overhead services and associated equipment	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 OHS policies and procedures related to requirements and established procedures for the installation and maintenance of LV overhead services and associated equipment are obtained and confirmed for the purposes of the work to be performed and communicated.
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
	1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
	1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.

ELEMENT	PERFORMANCE CRITERIA
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.
2 Carry out installation and maintenance of LV overhead services and associated equipment	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Essential knowledge and associated skills are applied in the safe installation and maintenance of LV overhead services and associated equipment to ensure completion to quality standards with a minimum of waste according to requirements.
	2.4 LV overhead services and associated equipment are installed according to the work schedule and requirements/established procedures.
	2.5 Maintenance, including repair and/or replacement of LV overhead services and associated equipment is carried out, in accordance with the work schedule and requirements/established procedures.
	2.6 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.

ELEMENT	PERFORMANCE CRITERIA
	2.7 Unplanned events during the installation and maintenance of LV services and associated equipment are undertaken within the scope of established procedures.
	2.8 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.9 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the installation and maintenance of LV overhead services and associated equipment	3.1 Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, the LV overhead services and associated equipment are returned to service in accordance with requirements.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining low voltage services (overhead).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS56A Low voltage electrical overhead service installation

Evidence shall show an understanding of the installation of low voltage electrical services to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements

T2 Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, encompassing:

- Types of low voltage overhead services
- Methods of construction and installation
- Minimum clearances for overhead services to assets and structures
- Ground clearances for overhead services
- Maximum span lengths and tensions for overhead services
- Customer poles

T3 Installation equipment/tools

- Equipment and tools for overhead service installation
- Fittings and hardware for overhead service installation

T4 Characteristics and applications of different types of cables encompassing:

- Cable cross-sectional area of conductors
- Current rating and fuse types and ratings

T5 Stringing and terminating methods encompassing:

- Energised and de-energised cables
- Connections to point of attachment, fuse boxes and pole top boxes
- Termination at customer pole

T6 Connection of overhead services:

- Types of overhead service connections
- Live low voltage work principles

T7 Techniques for maintenance of overhead service installations encompassing:

- Diagnosis and repair of faults
- Removing, repairing and replacing of damaged overhead services

REQUIRED SKILLS AND KNOWLEDGE

- Removing and replacing pole type fuses

T8 Testing and commissioning procedures encompassing:

- Inspection
- Equipment functionality tests
- Continuity tests
- Polarity, voltage and phase sequence tests
- Neutral and phase identification tests
- Neutral integrity tests
- Meter function test
- Testing check forms

T9 Connection principles:

- Purpose and function of MEN system
- Types of connection faults
- Causes and effects of incorrect and poor electrical connections
- Principles of loop impedance
- Reasons for and methods used to maintain standard phase sequencing
- Purpose and operation of service fusing
- Use of independent earth for testing

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment

is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace

procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least two of the following:	Overhead service line (three phase)* Overhead service line (single phase) Overhead service line (two phase) (* must do)
B	At least one of the following:	Service fuse Circuit breakers (pole) Service link
C	All of the following:	Polarity test * Phase rotation test Continuity test Voltage test

		(* must do)
D	At least one of the following:	Aluminium LV mains Copper LV mains LV ABC mains
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of overhead LV services.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit

applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of overhead low voltage services as they relate to distribution circuits and associated equipment and includes the identification of faults.

Installation may include, the erection and connection of service lines, the fitting and connection of pole fuses or circuit breakers and the testing and commissioning of the service.

Maintenance may include the identification and diagnosis of faults, the removal, replacement or repair of service lines and associated hardware and the temporary installation of services and associated equipment and the testing and commissioning of the service.

Testing procedures may include continuity, polarity, phase rotation, insulation resistance and voltage.

Testing equipment may include, digital/analogue voltage testers, multimeters, phase rotation testers, load testers, insulation resistance and continuity testers.

Associated hardware may include pole fuse units, circuit breakers, contactors, mains connection boxes.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures

RANGE STATEMENT

- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS57A Conduct visual checking and treatment of power system poles and structures

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the conducting of ground line inspection and treatment of poles and structures in accordance with enterprise procedures. It includes work associated with testing or examining, at eye level to below ground and the visual checking above ground of the crossarm and hardware attached with the use of binoculars, so as to determine the integrity of the poles, structures and hardware attached to them. It also encompasses the completion of inspection reports and the updating of records to enterprise requirements.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice

3)

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Electrotechnology Systems Electrician

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment

Prerequisite Unit(s)

4)

UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDREL16A	Working safely near live electrical apparatus

Transmission Overhead Pathway Group

Unit Code	Unit Title
UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTD RTP26A	Install transmission structures and associated hardware
UETTD RTP27A	Maintain transmission structures and associated hardware
UETTD RTP29A	Install and maintain transmission overhead conductors and cables
UETTD RTP30A	Inspect transmission overhead structures and electrical apparatus

Distribution Overhead Pathway Group

Unit Code	Unit Title
UETTD RDP11A	Inspect overhead poles/structures and electrical apparatus
UETTD RDP12A	Maintain overhead energised low voltage conductors and cables
UETTDNIS41A	Install network infrastructure electrical

Prerequisite Unit(s)

4)

equipment

UETTDRIS42A Maintain network infrastructure electrical equipment

UETTDRIS52A Install and maintain poles, structures and associated hardware

UETTDRIS54A Install and maintain poles, structures, overhead conductors and cables

UETTDRIS56A Install and maintain low voltage overhead services

Rail Traction Pathway Group

Unit Code Unit Title

UETTDRIS52A Install and maintain poles, structures and associated hardware

UETTDRIS54A Install and maintain poles, structures, overhead conductors and cables

UETTDRRT21A Install traction overhead wiring systems

UETTDRRT22A Maintain traction overhead wiring systems

UETTDRRT23A Install rail traction bonds

UETTDRRT27A Install overhead traction components and equipment

UETTDRRT28A Maintain overhead traction components and equipment

Distribution Cable Jointing Pathway Group

Unit Code Unit Title

UETTDRCJ21A Lay ESI electrical cables

UETTDRCJ26A Install and maintain de-energised low voltage underground polymeric cables.

UETTDRCJ27A Install and maintain de-energised high

Prerequisite Unit(s)	4)	voltage underground polymeric cables.
	UETTDRDP11A	Inspect overhead poles/structures and electrical apparatus
	UETTDRIS41A	Install network infrastructure electrical equipment
	UETTDRIS42A	Maintain network infrastructure electrical equipment
	UETTDRIS55A	Install and maintain low voltage underground services

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to perform visual checking and treatment of poles and structures	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the visual checking and treatment of poles and structures are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p>

ELEMENT	PERFORMANCE CRITERIA
	1.8 Relevant personnel at worksite are confirmed current in First Aid, Rescue and other related work procedures according to requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.
2 Carry out visual checking and treatment of poles and structures	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Essential knowledge and associated skills are applied for the safe performance of visual checking and treatment of poles and structures to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.5 Visual checking by testing or examining pole

ELEMENT

PERFORMANCE CRITERIA

		and/or structures from approximately eye level to below ground according is performed .to requirements and established procedures.
	2.6	Defective or suspect poles are identified according to established procedures.
	2.7	Treatment of poles and/or structures is carried out, in accordance with the work schedule and requirements/established procedures.
	2.8	Unplanned events during the visual checking and treatment of poles and structures are undertaken within the scope of established procedures.
	2.9	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.10	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3	Complete the visual checking and treatment of poles and structures	
	3.1	Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3	Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5	Relevant work permit(s) are signed off and, of poles and structures are returned to service in accordance with requirements.
	3.6	Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and

ELEMENT

PERFORMANCE CRITERIA

appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of conducting visual checking and treatment of poles and structures.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS57A Testing and treatment of poles and structures

Evidence shall show an understanding of the inspection of poles and overhead lines to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements

T2 Chemical treatment principles encompassing:

- Types of chemical used to treat timber
- Regulations and procedures in handling and transporting chemicals safely
- Application procedures of chemicals to wood

T3 Deterioration prevention techniques encompassing:

- Relationship between steel, concrete and wood
- Inspection procedures for deterioration
- Deterioration prevention procedures in steel, concrete and wood
- Procedures for the repair of deterioration in steel, concrete and wood

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least one of the following:	Wood Steel Concrete Composite
B	At least one of the following:	Stress tester Drill test. Non intrusive test
C	At least one of the following:	Chemical treatment Re-butting Nailing Welding Stays/guys
D	All of the following:	Recording Reporting
E	At least two of the following:	Cross-arms Insulators Surge arrestors Support brackets
F	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice

using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual visual checking and treatment of poles and structures.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the conducting of ground line inspection and treatment, including testing or examining of to determine the integrity of the poles and structures.

Poles and structure types include wood, steel, concrete and composite.

Hardware attached to poles/structures include crossarms, insulators, surge arrestors and support brackets.

Inspection/testing devices may include electronic data capture devices, computers, sonic testing devices, stress tester, binoculars and drilling tests.

Maintenance may include chemical treatment, emergency repair or welding, or life extension by re-butting or nailing.

Recording and reporting systems

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect

RANGE STATEMENT

- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS58A Locate faults in power system underground power cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the diagnosis and location of faults in underground power cables. It includes obtaining the required “access to test” or equivalent permit, setting up of the fault location test equipment and following the procedure to carry out the cable fault location test plan. It also encompasses the interpreting test results, documenting the actual fault location and likely cause and, listing the recommendations for correcting the cable fault to meet client requirements.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice**3)**

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits

Prerequisite Unit(s) 4)

UETTDRCJ21A	Lay ESI electrical cables
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDREL16A	Working safely near live electrical apparatus
UETTDRI41A	Install network infrastructure electrical equipment
UETTDRI42A	Maintain network infrastructure electrical equipment
UETTDRI55A	Install and maintain low voltage underground services

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading	3	Writing	3	Numeracy	3
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Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the

Employability Skills

5)

qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Prepare to locate faults in underground power cables	1.1	Works schedule(s), including cable specifications and standards, cable route data, history, and characteristics, drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.3	OHS policies and procedures related to requirements and established procedures for the location of faults in underground power cables are obtained and confirmed for the purposes of the work to be performed and communicated.
		1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
		1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.

ELEMENT	PERFORMANCE CRITERIA
1.6	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
1.7	Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
1.8	Test equipment is assembled and checked for calibration status as per established procedures.
1.9	Cable fault location test procedures/plan is prepared taking account the range of tests required and according to requirements/established procedures.
1.10	Relevant personnel at worksite are confirmed current in First Aid, and other related work procedures according to requirements.
1.11	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
1.12	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
1.13	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
1.14	Road signs, barriers and warning devices are positioned in accordance with requirements.
2 Carry out the location of faults in underground power cables	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working in confined spaces

ELEMENT**PERFORMANCE CRITERIA**

- and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Essential knowledge and associated skills are applied for the safe location of faults in underground power cables, to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.4 Cable is tested to determine the location of the relevant faults according to the work schedule, cable fault location test procedures/plan and requirements/established procedures.
- 2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.6 Unplanned events in the location of faults in underground power cables are undertaken within the scope of established procedures.
- 2.7 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.8 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 3 Complete the location of faults in underground power cables
- 3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures Test results are interpreted to determine the cable fault location, the type of fault and/or possible cause.
- 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.

ELEMENT**PERFORMANCE CRITERIA**

- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, cable/site are returned to service in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of locating faults in underground power cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS58A Power system underground power cables fault finding

Evidence shall show an understanding of the locating of faults in power system underground power cables to an extent indicated by the following aspects:

T1 Installation of underground cable encompassing:

- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Safety precautions specific to the installation of underground cable - excavation and trench safety regulations, gas detection procedures, working in confined spaces, personal protective equipment, hazards for the use of LPG equipment for jointing of underground cable, gas bottle testing procedures, permit to work systems and isolation procedures.
- Trench excavation and reinstatement procedures
- Installation of underground cable procedures - types of tools and equipment, methods of installing conduits, methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)
- Procedures for the safe use of LPG equipment for cable jointing

T2 Location of cable faults in underground power cables encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Types of faults
- Methods of locating faults - Murray loop test, Fisher connection of Murray loop, modified Fisher connection, Varley loop test, time domain reflectometer (TDR), differential TDR radar, digital arc reflection, differential digital arc reflection, current impulse test, differential current impulse, decay, differential decay, pool of potential in earth (POPIE), radio detection, capacitance inductance test; pending faults (thermography and cable/joint temperature measurement); cable location devices/equipment and methods (signal generator/receiver, phasing methods using 'megger', current injection, cable stabbing techniques);cable identification
- Low voltage energised working practices: - regulations, working methods, insulating glove, bare hand, work procedures, specialist equipment.
- Safety precautions specific to working near conductors - safe working practices and procedures, working in confined spaces, permit to work systems and isolation procedures.

REQUIRED SKILLS AND KNOWLEDGE

T3 Jointing and termination of LV polymeric cable encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the jointing of LV polymeric cables
- Types of cables - single core, multi core and XLPE insulation
- Methods of cable handling - direct laid cables, duct laid cables, solid laid cables, cables supported in cleats or hangers, corrosion protection, minimum bending radius of cables.
- Methods of cable sealing - shorting of cables cores, core of un-terminated cables, methods of protection from corrosion, polymeric sheathed cables sealing with mastic lined, heat shrink caps buried sealed ends.
- Types of jointing tools - general hand tools, compression tools
- Techniques in the use of LPG - safety precautions, personal protective equipment, general maintenance and repair.
- Safety precautions when cable jointing - working in confined spaces, permit to work systems and isolation procedures, emergency rescue/response including First Aid.

T4 LV polymeric cable jointing principles encompassing:

- Techniques in jointing LV XLPE cables - straight through joint, jointing different types of cable and service and street light cable joints
- Techniques in terminating LV XLPE - pole top terminations, substation terminations, distribution pillar /column/cubicle terminations and service and street light cable terminations
- Techniques in repairing LV XLPE cable - different types of damage, repairs to sheath, repairs to cores
- Methods of testing cable after jointing

T5 Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the jointing of HV underground polymeric cables

T6 HV underground polymeric cables requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, encompassing:

- Characteristics of different types of cables and components
- Purpose of stress control
- Applications of various tools and equipment for HV jointing

T7 Procedure for isolating HV underground polymeric cables encompassing:

- Method for proving safe to work
- Earthing procedures

T8 Techniques in jointing HV underground polymeric cable, encompassing:

- Short circuit cores and seal cable
- Straight through
- Trifurcating

REQUIRED SKILLS AND KNOWLEDGE

T9 Techniques in HV underground polymeric cable terminations encompassing:

- Pole top termination
- Substation/switchgear termination
- ABC termination
- Telcon termination

T10 Procedures for repairing HV underground polymeric cables encompassing:

- Location of faults
- Types of damage
- Techniques to repairs to sheath
- Techniques to repairs to core

T11 Jointing LV paper lead/lead type cables encompassing:

- Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- Types of tools and equipment
- Types of LV cables
- Structure of LV PLY cables
- Techniques for lead wiping
- Technique for preparing and jointing LV lead sheathed paper insulated cables
- Installation methods of LV straight joint
- Inspection and repair procedures to outer sheath of lead sheathed LV cable
- Techniques in terminating LV lead sheathed paper insulated cables
- Methods of testing cable after jointing

T12 HV paper lead cable jointing principles encompassing:

- Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- Types of tools, equipment
- Types of HV cables
- Structure of HV cables
- Technique for the installation of transition joint between XLPE and lead sheathed, paper insulated cables
- Technique for the jointing, terminating and repairing of HV paper lead insulated cables
- Methods of testing cable after jointing

T13 Underground cables construction and types encompassing:

- Safety precautions specific to handling underground cables
- Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- Types and applications of UC

REQUIRED SKILLS AND KNOWLEDGE

- Construction types and structures of underground cables
- Characteristics of different types of underground cables
- Ratings

T14 Aluminium and lead cable sheathed — jointing procedures encompassing:

- Safety precautions specific to handling and jointing underground aluminium and lead cable including provision of OHS information such as material safety data sheets (MSDS)
- Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- Construction and structure(s) of aluminium and lead cable underground cables
- Characteristics of aluminium and lead cable
- Ratings
- Techniques in the jointing of aluminium and lead sheathed cable
- Methods of testing cable after jointing.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord

with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as

- specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least three of the following:	Time domain reflectometry Popie Differential TDR radar Current impulse Murray loop Varley loop Radio detection Capacitance/inductance Continuity tests Insulation tests Voltage detection
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated

		in the holistic assessment with the above listed items.
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Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual locating of faults in underground power cables.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the diagnosis and location of faults as it relates to underground power cables (Distribution and Transmission) and includes the receipt of the relevant permit(s).

Relevant cable specifications and standards may include but are not limited to cable ageing effects, test voltage de-rating, velocity of propagation, insulation, screened, armoured, burial status drawings, network diagrams, maker's installations, cable age and/or service history, owners/clients requests.

Cable fault test procedures may include but are not limited to time domain reflectometry (TDR), TDR radar, digital arc reflection, differential digital arc reflection, current impulse test (thumper test), differential current impulse, decay, differential decay, pool of potential in earth (POPIE), Murray loop test (including Fisher modification), radio detection, Varley loop test, capacitance inductance test.

Test equipment may include but are not limited to the calibration certificated for test equipment being current and valid for AF signals, bridges, pulse echo techniques, capacitors, seismophone, POPIE.

Hazards associated with the testing and location procedures may include but are not limited to environmental, traffic, chemical, fuel gas, warning notices, water or gas flooding, test voltages, public barriers.

Range of testing required may include but are not limited to the order in which testing will be applied, from where tests are to be applied, communication arrangements and who will be directing the tests.

Selected test procedures may include but are not limited to recognised standard test methods, client requirements.

Recorded results of the tests may include but are not limited to the requirements specified by the client or enterprise.

Results interpreted may include but are not limited to physical location notes, depth and distance.

Identified actual fault location may include but are not limited to the reports and test data, within how many metres of the measured position the fault was actually located, relationship between type of fault and possible cause, location and protection relay operations, known events related to the fault.

Correcting the cable fault may include but is not limited to providing recommendations for corrective action, preventative action.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

RANGE STATEMENT

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Industry Specific Cross-Discipline Units

UETTDRIS59A Conduct high potential testing of power system underground power cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the conducting of high potential testing of underground power cables. It includes obtaining the required “access to test” or equivalent permit, setting up of the fault location test equipment and following the procedure to carry out the cable test plan. It also encompasses the interpreting test results, documenting the actual testing and, recommendations to meet client requirements.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits

Prerequisite Unit(s)

4)

UETTDRCJ21A	Lay ESI electrical cables
UETTDRCJ26A	Install and maintain de-energised low voltage underground polymeric cables.
UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDREL16A	Working safely near live electrical apparatus
UETTDRISS41A	Install network infrastructure electrical equipment
UETTDRISS42A	Maintain network infrastructure electrical equipment
UETTDRISS55A	Install and maintain low voltage underground services

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|---|-----|--|
| 1 | 1. Prepare/plan to conduct high potential testing | 1.1 | Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination. |
| | | 1.2 | Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites. |
| | | 1.3 | OHS policies and procedures related to requirements and established procedures for the high potential testing are obtained and confirmed for the purposes of the work to be performed and communicated. |
| | | 1.4 | Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures. |

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|-------------------------------------|--|
| | 1.5 | Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures. |
| | 1.6 | Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures. |
| | 1.7 | Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order. |
| | 1.8 | Clients/Customers are provided with alternative methods within the: scope, acceptable cost and requirements. |
| | 1.9 | Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary. |
| | 1.10 | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures. |
| | 1.11 | Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures. |
| | 1.12 | Positioning of road signs, barriers and warning devices is planned in accordance with requirements. |
| 2 | 2. Carry out high potential testing | |
| | 2.1 | OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures. |
| | 2.2 | First Aid, Pole Top Rescue and other related work procedures are performed according to requirements and/or established procedures. |

ELEMENT	PERFORMANCE CRITERIA
	2.3 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.
	2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
	2.6 Conduction of high potential testing is carried out, in accordance with the work schedule and requirements and/or established procedures
	2.7 Essential knowledge and associated skills are applied in the safe conduction of high potential testing to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
3 3. Complete high potential testing	3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.

ELEMENT

PERFORMANCE CRITERIA

- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, underground cables are returned to service and advised to client/customer in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of conducting high potential testing of underground power cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS59A Power system underground power cables testing

Evidence shall show an understanding of the conducting high potential testing of power system underground power cables to an extent indicated by the following aspects:

T1 Installation of underground cable encompassing:

- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Safety precautions specific to the installation of underground cable - excavation and trench safety regulations, gas detection procedures, working in confined spaces, personal protective equipment, hazards for the use of LPG equipment for jointing of underground cable, gas bottle testing procedures, permit to work systems and isolation procedures.
- Trench excavation and reinstatement procedures
- Installation of underground cable procedures - types of tools and equipment, methods of installing conduits, methods of installing cables and sealing cable ends (direct buried, ducts cleaned and racked)
- Procedures for the safe use of LPG equipment for cable jointing

T2 Location of cable faults in underground power cables encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Types of faults
- Methods of locating faults - Murray loop test, Fisher connection of Murray loop, modified Fisher connection, Varley loop test, time domain reflectometer (TDR), differential TDR radar, digital arc reflection, differential digital arc reflection, current impulse test, differential current impulse, decay, differential decay, pool of potential in earth (POPIE), radio detection, capacitance inductance test; pending faults (thermography and cable/joint temperature measurement); cable location devices/equipment and methods (signal generator/receiver, phasing methods using 'megger', current injection, cable stabbing techniques); cable identification
- Low voltage energised working practices: - regulations, working methods, insulating glove, bare hand, work procedures, specialist equipment.
- Safety precautions specific to working near conductors - safe working practices and procedures, working in confined spaces, permit to work systems and isolation procedures.

REQUIRED SKILLS AND KNOWLEDGE

T3 Jointing and termination of LV polymeric cable encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the jointing of LV polymeric cables
- Types of cables - single core, multi core and XLPE insulation
- Methods of cable handling - direct laid cables, duct laid cables, solid laid cables, cables supported in cleats or hangers, corrosion protection, minimum bending radius of cables.
- Methods of cable sealing - shorting of cables cores, core of un-terminated cables, methods of protection from corrosion, polymeric sheathed cables sealing with mastic lined, heat shrink caps buried sealed ends.
- Types of jointing tools - general hand tools, compression tools
- Techniques in the use of LPG - safety precautions, personal protective equipment, general maintenance and repair.
- Safety precautions when cable jointing - working in confined spaces, permit to work systems and isolation procedures, emergency rescue/response including First Aid.

T4 LV polymeric cable jointing principles encompassing:

- Techniques in jointing LV XLPE cables - straight through joint, jointing different types of cable and service and street light cable joints
- Techniques in terminating LV XLPE - pole top terminations, substation terminations, distribution pillar /column/cubicle terminations and service and street light cable terminations
- Techniques in repairing LV XLPE cable - different types of damage, repairs to sheath, repairs to cores
- Methods of testing cable after jointing

T5 Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the jointing of HV underground polymeric cables

T6 HV underground polymeric cables requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, encompassing:

- Characteristics of different types of cables and components
- Purpose of stress control
- Applications of various tools and equipment for HV jointing

T7 Procedure for isolating HV underground polymeric cables encompassing:

- Method for proving safe to work
- Earthing procedures

T8 Techniques in jointing HV underground polymeric cable, encompassing:

- Short circuit cores and seal cable
- Straight through
- Trifurcating

REQUIRED SKILLS AND KNOWLEDGE

T9 Techniques in HV underground polymeric cable terminations encompassing:

- Pole top termination
- Substation/switchgear termination
- ABC termination
- Telcon termination

T10 Procedures for repairing HV underground polymeric cables encompassing:

- Location of faults
- Types of damage
- Techniques to repairs to sheath
- Techniques to repairs to core

T11 Jointing LV paper lead/lead type cables encompassing:

- Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- Types of tools and equipment
- Types of LV cables
- Structure of LV PLY cables
- Techniques for lead wiping
- Technique for preparing and jointing LV lead sheathed paper insulated cables
- Installation methods of LV straight joint
- Inspection and repair procedures to outer sheath of lead sheathed LV cable
- Techniques in terminating LV lead sheathed paper insulated cables
- Methods of testing cable after jointing

T12 HV paper lead cable jointing principles encompassing:

- Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- Types of tools, equipment
- Types of HV cables
- Structure of HV cables
- Technique for the installation of transition joint between XLPE and lead sheathed, paper insulated cables
- Technique for the jointing, terminating and repairing of HV paper lead insulated cables
- Methods of testing cable after jointing

T13 Underground cables construction and types encompassing:

- Safety precautions specific to handling underground cables
- Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- Types and applications of UC

REQUIRED SKILLS AND KNOWLEDGE

- Construction types and structures of underground cables
- Characteristics of different types of underground cables
- Ratings

T14 Aluminium and lead cable sheathed — jointing procedures encompassing:

- Safety precautions specific to handling and jointing underground aluminium and lead cable including provision of OHS information such as material safety data sheets (MSDS)
- Requirements for the use of enterprise manuals, system diagrams/plans and drawings
- Construction and structure(s) of aluminium and lead cable underground cables
- Characteristics of aluminium and lead cable
- Ratings
- Techniques in the jointing of aluminium and lead sheathed cable
- Methods of testing cable after jointing.

T15 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on	Item List

	which skill is to be demonstrated	
A	All of the following:	Tests to be conducted on HV distribution cable Tests to be conducted on HV transmission cable
B	At least one of the following:	HV polymeric HV paper Insulated Oil Filled Gas Filled
C	At least four of the following:	Phasing instruments* DC high potential tester* Voltage detectors Insulation testers* Continuity testers Cable identification instrument (*must do)
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual conducting of high potential testing of underground cables.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRIIS18B Locate faults in underground power cables

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to conducting high potential testing of underground power cables and may including the following:

Cable type includes: distribution and transmission polymeric, solid paper insulated, oil filled and gas filled underground cables.

Test and recording equipment may include voltage detectors, cable identification equipment, insulation resistance, DC High Potential testers, phasing instruments.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS60A Install and replace power system energy meters and associated equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and replacement of whole current energy meters and associated equipment, where replacement may include the identification of faults in accordance with established procedures and return to service. It includes the requirements to ascertain if normal functions of the meters and associated equipment are in accordance with established procedures.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Distribution Overhead

Distribution Cable Jointing

Electrotechnology Electrician

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic

Prerequisite Unit(s)

4)

devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. Circuits

UETTDREL16A Working safely near live electrical apparatus

Distribution Overhead Pathway Group

Unit Code Unit Title

UETTDNDP12A Maintain overhead energised low voltage conductors and cables

UETTDREL11A Apply sustainable energy and environmental procedures

UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus

UETTDNIS41A Install network infrastructure electrical equipment

UETTDNIS42A Maintain network infrastructure electrical equipment

UETTDNIS52A Install and maintain poles, structures and associated hardware

UETTDNIS54A Install and maintain poles, structures, overhead conductors and cables

UETTDNIS56A Install and maintain low voltage overhead services

Distribution Cable Jointing Pathway Group

Unit Code Unit Title

UETTDNRCJ21A Lay ESI electrical cables

UETTDNRCJ26A Install and maintain de-energised low voltage underground polymeric cables.

UETTDNRCJ27A Install and maintain de-energised high voltage underground polymeric

Prerequisite Unit(s)

4)

cables.

UETTDREL11A Apply sustainable energy and environmental procedures

UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus

UETTDRLS41A Install network infrastructure electrical equipment

UETTDRLS42A Maintain network infrastructure electrical equipment

UETTDRLS55A Install and maintain low voltage underground services

Electrotechnology Electrician Pathway Group

Unit Code Unit Title

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical

Prerequisite Unit(s) 4)

	installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits
UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the installation and replacement of energy meters and associated equipment	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the installation and replacement of energy meters and associated equipment are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Resources including personnel, equipment, tools and Resources including personnel, equipment, tools and personnel protective equipment required for the job are obtained and confirmed in working order.</p> <p>1.7 Relevant personnel at worksite are confirmed current in First Aid, Rescue and other related work procedures according to requirements.</p>

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|--|---|
| | 1.8 | Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary. |
| | 1.9 | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures. |
| | 1.10 | Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures. |
| | 1.11 | Road signs, barriers and warning devices are positioned in accordance with requirements. |
| 2 | Carry out the installation and replacement of energy meters and associated equipment | |
| | 2.1 | OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures. |
| | 2.2 | Lifting, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed. |
| | 2.3 | Essential knowledge and associated skills are applied in the safe installation and replacement of energy meters and associated equipment to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements. |
| | 2.4 | Installation and/or replacement of energy meters and associated equipment is carried out, including, as required, wiring, testing, programming and sealing and of meter(s) and associated equipment in accordance with requirements and enterprise requirements. |
| | 2.5 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions |

ELEMENT

PERFORMANCE CRITERIA

- according to established procedures.
- 2.6 Unplanned events during the installation and replacement of energy meters and associated equipment are undertaken within the scope of established procedures.
- 2.7 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.8 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 3 Complete the installation and replacement of energy meters and associated equipment
- 3.1 Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
- 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and replacing energy meters and associated equipment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS60A Power system energy meters and associated equipment

Evidence shall show an understanding of the installation and/or replacement power system energy meters and associated equipment to an extent indicated by the following aspects:

T1 Cable protection and support method and accessories encompassing:

- Requirements to protect and support cables adequately - protection against mechanical damage, protection from adverse temperatures and corrosion and protection from magnetic field that may affect the performance of the cable.
- Cable support and protection devices, accessories and typical applications - metallic and non-metallic conduits, duct and trunking, cable ladder and tray, cable clips and ties and related accessories.
- Installation techniques - cable installation equipment, cable drawing and hauling techniques.

T2 Types of cables used in electrotechnology and their application encompassing:

- Structural components of cables and their purpose - conductors and conductor material; insulation; sheathings and servings.
- Application of various cables types
- Cable varieties - single cables, flexible cables, flexible cords, shielded cables, armoured cables, ribbon cables, other similar and like cables
- Typical characteristics and use of power circuit cables and control circuit cables

T3 Installing cables in buildings, structures and premises encompassing:

- Building construction method and construction sequence.
- Typical cable routes through buildings, structures and premises.
- Building codes affecting the installation of cables in buildings, structures and premises - limitation on penetration structural elements and maintenance of fire protection interiority
- Cable segregation requirements

T4 Basic cable and conductor terminations encompassing:

- Insulation removal and replacement
- Conductor handling and cable terminations - general aspects and soldering involving pins on electronic components and stranded conductors carrying current up to 25 amperes, application of connecting devices for conductors and terminals,

REQUIRED SKILLS AND KNOWLEDGE

continuity through connections and insulation resistance testing, stress release on cables/conductors.

T5 Power cable and conductor terminations encompassing:

- Types of cable glands and their application - glands for circular sheathed cables; steel wire armoured (SWA) cables and mineral-insulated metal-sheathed (MIMS) cables.
- Cable termination techniques
- Terminal types and applications
- Conductor termination techniques - need for sound termination, consequences of poor conductor termination, conductor and terminal preparation.

T6 Telecommunication cable and conductor terminations encompassing:

- Approved termination devices and sockets.
- Special termination tools and their use.
- Cable colour coding up to 100 pair indoor and outdoor cable
- End to end testing
- Methods of terminating cables - cables less than twenty pair, twenty pair cable and greater
- Cable labelling devices
- Colour coding of cables, sockets and termination modules and standard connectors used with twisted pair, optical fibre and coaxial cables

T7 Terminating cable and conductor used in electronic equipment encompassing:

- Cable and conductor types and characteristics - insulated wire, harness wiring, high performance cables (transmission performance parameters and electrical characteristics)
- Types include UTP, FTP, and STP
- Coaxial cables types and characteristics - types include qualshield, trishield coaxial are armour plated coaxial cables
- Cable anchoring and support methods
- Termination methods

T8 Installation of metering and control equipment encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
- Types of meters - kilowatt-hour meters single and polyphase, demand meters, recording meters and electronic recording metering systems summators
- Installation and removal methods - direct connection and plug in method, enterprise specific
- Types of associated equipment and accessories - meter boards, service fuse, links, contactors, time switch, audio frequency injection relay
- Testing procedures - safety testing, polarity testing

REQUIRED SKILLS AND KNOWLEDGE

T9 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker's body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair
- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Any one of the following:	Induction disk energy meter Electronic energy meters Maximum demand meters Electronic summators
B	At least one of the following:	Service fuses Service links Meter boards Meter panels
C	At least one of the following:	Time switches Frequency injection relays Controlled output meters Contactors
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to undertake actual installation and replacement of energy meters and associated equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and replacement of whole current energy meters and associated equipment, where replacement may include the identification of faults and the return to service.

Installation may include single and polyphase meters and associated equipment.

Replacement may include the removal and return to service of “like for like” energy meters and associated equipment in a variety of environments and contexts.

Associated equipment includes load control devices such as time switches and audio frequency injection relays, plug in meter bases, service fuses and links, contactors and meter boards and panels where the installation uses direct-wired (non-current transformer) metering.

Meters include induction disc energy meters, electronic energy meters, maximum demand meters, electronic summators, time switches and relays, provided that they are basic direct-wired instruments. Current transformer metering is not included.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards

RANGE STATEMENT

- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS61A Install mobile generation set for synchronised LV Genset

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers installation of temporary portable generation sets to LV distribution assets thereby maintaining supply in accordance with requirements, industry regulations, and established procedures. It encompasses the operation, connection and disconnection of a temporary portable generator and includes the estimation of LV load and assessing the appropriateness of the generator for the required outcome.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice**3)**

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Electrotechnology Electrician

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules,

Prerequisite Unit(s)	4)	standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL16A	Working safely near live electrical apparatus
Transmission Overhead Pathway Group		
	Unit Code	Unit Title
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTD RTP26A	Install transmission structures and associated hardware
	UETTD RTP27A	Maintain transmission structures and associated hardware
	UETTD RTP29A	Install and maintain transmission overhead conductors and cables
Distribution Overhead Pathway Group		
	Unit Code	Unit Title
	UETTD RDP12A	Maintain overhead energised low voltage conductors and cables
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus

Prerequisite Unit(s)**4)**

UETTDNIS41A Install network infrastructure electrical equipment

UETTDNIS42A Maintain network infrastructure electrical equipment

UETTDNIS52A Install and maintain poles, structures and associated hardware

UETTDNIS54A Install and maintain poles, structures, overhead conductors and cables

UETTDNIS56A Install and maintain low voltage overhead services

Rail Traction Pathway Group

Unit Code	Unit Title
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UETTDREL11A	Apply sustainable energy and environmental procedures
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UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
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UETTDNIS52A	Install and maintain poles, structures and associated hardware
-------------	--

UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
-------------	--

UETTDNRRT21A	Install traction overhead wiring systems
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UETTDNRRT22A	Maintain traction overhead wiring systems
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UETTDNRRT23A	Install rail traction bonds
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UETTDNRRT27A	Install overhead traction components and equipment
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UETTDNRRT28A	Maintain overhead traction components and equipment
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Distribution Cable Jointing Pathway Group

Unit Code	Unit Title
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Prerequisite Unit(s)**4)**

- UETTDRCJ21A Lay ESI electrical cables
- UETTDRCJ26A Install and maintain de-energised low voltage underground polymeric cables.
- UETTDRCJ27A Install and maintain de-energised high voltage underground polymeric cables.
- UETTDREL11A Apply sustainable energy and environmental procedures
- UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus
- UETTDNIS41A Install network infrastructure electrical equipment
- UETTDNIS42A Maintain network infrastructure electrical equipment
- UETTDNIS55A Install and maintain low voltage underground services

Electrotechnology Electrician Pathway Group

- | Unit Code | Unit Title |
|-------------|--|
| UEENEEE137A | Document and apply measures to control OHS risks associated with electrotechnology work |
| UEENEEG006A | Solve problems in single and three phase low voltage machines |
| UEENEEG033A | Solve problems in single and three phase electrical apparatus and circuits |
| UEENEEG063A | Arrange circuits, control and protection for general electrical installations |
| UEENEEG103A | Install low voltage wiring and accessories |
| UEENEEG104A | Install appliances, switchgear and associated accessories for low voltage electrical installations |
| UEENEEG106A | Terminate cables, cords and accessories |

Prerequisite Unit(s)	4)	
		for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to install mobile generation set for synchronised genset LV	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 OHS policies and procedures related to the work are used and actioned to ensure safe systems of work are followed.
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personnel protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.

ELEMENT	PERFORMANCE CRITERIA
	1.8 Clients/customers are provided with alternative methods within the scope, acceptable cost and requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
	1.12 Positioning of road signs, barriers and warning devices is planned in accordance with requirements.
2 Carry out the installation of mobile generation set for synchronised genset LV	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
	2.2 First Aid and other related work procedures are performed according to requirements and/or established procedures.
	2.3 Lifting, climbing, working in confined spaces and aloft, rescue procedures and use of power tools/equipment, techniques and practices are safely exercised according to requirements.
	2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established

ELEMENT	PERFORMANCE CRITERIA
	procedures.
	2.6 The installation of mobile generation set for synchronised genset LV is carried out, in accordance with the work schedule and requirements and/or established procedures.
	2.7 Essential knowledge and associated skills are applied in the safe installation of mobile generation set for synchronised genset LV to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
3 Complete the installation of mobile generation set for synchronised genset LV	3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures.
	3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, synchronised genset LV apparatus is returned to service and advised to client/customer in accordance with requirements.

ELEMENT**PERFORMANCE CRITERIA**

- 3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge**REQUIRED SKILLS AND KNOWLEDGE**

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing mobile generation set for synchronised genset LV.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS61A LV mobile generator

Evidence shall show an understanding of the installation and control of a mobile generator to an extent indicated by the following aspects:

T1 Safety precautions specific to installing mobile generators encompassing:

- Safe working practices and procedures
- Techniques in connecting, operating and disconnecting generators
- Types of tools and equipment
- Safe use of tools and equipment

T2 Techniques in the installation of gensets encompassing:

- The synchronising of generator control systems onto and off the network without interruption to supply
- Estimation of LV load
- Assessing the appropriateness of the generator

T3 Operating a generator in parallel to a single LV job encompassing:

- Overhead systems
- Indoor systems
- Customer Installations
- Kiosk Substations
- LV genset and control system to LV Distribution assets

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	<p>Operation of the generator</p> <p>Connection of the generator</p> <p>Disconnection of the generator</p>
B	All of the following:	<p>The synchronising of generator control systems onto the network without interruption to supply</p> <p>The synchronising of generator control systems off the network without interruption to supply</p>
C	All of the following:	<p>Estimation of LV load of the generator</p> <p>Assessing the appropriateness of the generator</p>
D	All of the following:	<p>Operating a generator in parallel to a single LV job</p>
E	At least one occasion	<p>Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.</p>

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation of a synchronised generation set.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation of temporary portable generation sets to LV distribution assets for maintenance of supply that is in accord with requirements, industry regulations and established procedures. It includes the operation, connection and disconnection of a temporary portable generator and includes the estimation of LV load and assessing the appropriateness of the generator for the required outcome, and may include the following:

Overhead systems, Indoor systems, Customer Installations, Kiosk Substations, LV genset and control system to LV Distribution assets.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS62A Implement and monitor the power system organisational OHS policies, procedures and programs

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the implementation and monitoring of the participative arrangements for the management of the organisational OHS policies procedures, programs and issues, including disseminating information on hazards and risk assessment to meet OHS standards. It also encompasses the collation of work group input, as well as implementation of enterprise procedures for resolving OHS issues.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL16A	Working safely near live electrical apparatus

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|--|--|
| 1 Prepare/Plan to implement and monitor the organisational OHS policies, procedures and programs | 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination. |
| | 1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites. |
| | 1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures. |
| | 1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures. |

ELEMENT	PERFORMANCE CRITERIA
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
	1.8 Clients/Customers are provided with alternative methods within the scope, acceptable cost and requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Site is prepared according to the work schedule and to minimise OHS risk, damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including contractors, are fully briefed and respective responsibilities authorised and coordinated where applicable in accordance with established procedures.
	1.12 Positioning of road signs, barriers and warning devices is planned in accordance with traffic control management requirements and established procedures.
2 Carry out the implementation and monitoring of the organisational OHS policies, procedures and programs	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are implemented and monitored in accordance with requirements and/or established procedures.
	2.2 First Aid, Pole Top Rescue and other related work procedures are performed according to

ELEMENT

PERFORMANCE CRITERIA

- requirements and/or established procedures.
- 2.3 Lifting, climbing, working in confined spaces, working at heights, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.
- 2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are risk control measures are implemented, preventative action taken and monitored and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
- 2.6 Implementation and monitoring of the participative arrangements for the systematic management of organisational OHS policy procedures, programs and issues are carried out, in accordance with the work schedule and requirements and/or established procedures.
- 2.7 Essential knowledge and associated skills are applied in the safe implementation and monitoring of the participative arrangements for the management of organisational OHS policy procedures, programs and issues to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
- 2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the implementation and monitoring of the organisational OHS policies, procedures and programs	<p>3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.</p> <p>3.2 Accidents, incidents and/or injuries are reported in accordance with requirements/established procedures.</p> <p>3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.</p> <p>3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.5 Relevant work permit(s) are signed off and, the work completed/returned to service and advised to client/customer in accordance with requirements.</p> <p>3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of implementing and monitoring the organisational OHS policies, procedures and programs.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS62A OHS policies, procedures and programs - implementation and monitoring

Evidence shall show an understanding of the implementation and monitoring of power system organisational OHS policies, procedures and programs to an extent indicated by the following aspects:

T1 Safe working practices and procedures for the installation of overhead distribution conductors encompassing:

- Limits of approach for personnel, vehicles, mobile plant and elevating work platforms (EWP)
- Requirements of persons prior to making bare hand contact with dead low voltage mains and apparatus
- Requirements of relevant electrical access permits necessary to allow work to be performed on low and high voltage apparatus
- Safe working practices - requirements to enable safe working on conductive poles, procedure to attach an “on-site” earthing device to de-energised low and high voltage overhead circuit.

T2 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker’s body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair
- Traffic management - purpose of traffic management and a line worker’s responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio

REQUIRED SKILLS AND KNOWLEDGE

- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

T3 Implementation and monitoring requirements for powerline safety encompassing:

- Identification of relevant legislation, codes and government guidelines for the implementation and monitoring of OHS in the workplace - Commonwealth/State/Territory legislation relevant to the workplace and the meaning of general duty of care under OHS legislation and common law.
- Workplace OHS enterprise plan - responsibilities of each member of the work team, review process for changing/improving OHS safety plan/standing instructions for the systematic management of OHS in the workplace.
- Relationship between the OHS committee and employees - methods used to collate and distribute/disseminate OHS information, staff development activities and legislation requirements with regards to OHS training, methods of addressing barriers such as literacy and cultural differences and provisions relating to OHS issue resolution
- Hazards associated with Powerline industry - identification of hazards in the workplace, processes used and contributing factors to a hazardous situation assessment of risks and control of OHS risks (risk management), the hierarchy of control and monitoring of risk control measures
- Risk assessment and its management in Powerline industry - principles and purposes of risk management, processes for conducting risk assessment including risk analysis and risk evaluation activities for selecting and implementing appropriate options for eliminating or minimising risk
- Maintenance strategies for OHS programs - developing processes for promoting, maintaining and improving OHS in the workplace and identify techniques for the evaluating and reviewing OHS education and training programs and elements of an effective OHS management system, OHS consultation and accident/incident investigations

T4 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures

REQUIRED SKILLS AND KNOWLEDGE

- Rules and regulations, Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T5 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T6 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following	Relevant OHS Acts Regulations Codes of practice
B	All of the following	Application of organisation management systems and procedures to OHS Organisation's procedure for maintaining OHS records
C	All of the following applications of risk management procedures	Undertake hazard identification Risk assessment and risk control in accordance with the hierarchy of control Application of the characteristics of the workforce impacting on the management of OHS
D	All of the following implementation and monitoring procedures.	Provision of relevant information to the workgroup about OHS and the organisation's OHS policies, procedures and programs. Participative arrangements for the management of OHS. Organisation's procedures for identifying hazards and assessing risks. Organisation's procedures for controlling risks. Organisation's

		<p>procedures for dealing with hazardous events.</p> <p>Organisation's procedure for providing OHS training.</p>
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Access to a range of emergencies and hazardous events (may be gathered through simulations)
- Access to workplace environment.
- Access to document on current OHS Acts, regulations and enterprise OHS policies and procedures.
- Access to personal protective equipment (PPE)

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRIS63 Implement and monitor the power system
A environmental and sustainable energy
management policies and procedures

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to implementing and monitoring the organisational OHS, policies and procedures and may include the following:

In accordance with all relevant OHS legislation, particularly: general duty of care; requirements for maintenance and confidentiality of records of occupational injury and disease; provision of information and training; regulations and codes of practice relating to hazards present in work area; health and safety representatives and OHS committees; issue resolution.

Hazardous events include accidents, fire and emergencies such as chemical spills or bomb scares. Procedures for dealing with them include evacuation, chemical containment and first aid procedures.

In accordance with workplace procedures for: risk assessment and management; inspection; housekeeping; participative arrangements, either general or specific to OHS training and assessment; specific hazard policies and procedures; OHS information; OHS record keeping; maintenance of plant and equipment; purchasing of supplies and equipment; and counselling/disciplinary processes.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Documenting detail work events, record keeping and or storage of information
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation

RANGE STATEMENT

- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS63A Implement and monitor the power system environmental and sustainable energy management policies and procedures

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit specifies the outcomes for the collecting, interpretation and application of environmental management information, identification of environmental impacts and assessment of risks and establishment of best practice procedures for implementation of the management plans to ensure compliance. It also consists of monitoring during the implementing of, environmental and sustainable energy policies and plans and, development of modifications as part of the review process.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice

3)

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Electrotechnology Pathway Unit Group

Unit Code	Unit Title
UEENEEK142A	Apply environmental and sustainable procedures in the energy sector

ESI – TDR Pathway Unit Group

UETTDREL11A	Apply sustainable energy and environmental procedures
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Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|--|---|
| 1 Prepare/plan to implement and monitor environmental and sustainable energy management policies and procedures | 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination. |
| | 1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures. |
| | 1.3 Relevant requirements and established procedures for the work are to all personnel and identified for all work sites. |

ELEMENT

PERFORMANCE CRITERIA

- 1.4 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
- 1.5 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
- 1.7 Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
- 1.8 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.9 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities authorised and coordinated where applicable in accordance with established procedures.
- 1.10 Site is prepared according to the work schedule and to minimise OHS risk, damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Positioning of road signs, barriers and warning devices is planned in accordance with requirements, traffic control management requirements and established procedures.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the implementation and monitoring of environmental and sustainable energy management policies and procedures	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are implemented and monitored and actioned in accordance with requirements and/or established procedures.</p> <p>2.2 First Aid, Pole Top Rescue and other related work procedures are performed according to requirements and/or established procedures.</p> <p>2.3 Lifting, climbing, working in confined spaces, working at heights, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.</p> <p>2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are risk control measures are implemented, preventative action taken and monitored and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.</p> <p>2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.</p> <p>2.6 Implementation and monitoring of environmental and sustainable energy management policies and procedures are carried out, in accordance with the work schedule and requirements and/or established procedures.</p> <p>2.7 Essential knowledge and associated skills are applied in the safe implementation and monitoring of environmental and sustainable energy management policies and procedures to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.</p>

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|---|--|
| | 2.9 | Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard. |
| 3 | Complete the implementation and monitoring of environmental and sustainable energy management policies and procedures | |
| | 3.1 | Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures. |
| | 3.2 | Accidents, incidents and/or injuries are reported and followed up in accordance with requirements/established procedures. |
| | 3.3 | Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures. |
| | 3.4 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
| | 3.5 | Relevant work permit(s) are signed off and the work completed/returned to service and advised to client/customer in accordance with requirements. |
| | 3.6 | Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of implementing and monitoring environmental and sustainable energy management policies and procedures.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS63A Power system environmental and sustainable energy management policies and procedures - implementation and monitoring

Evidence shall show an understanding of the implementation and monitoring the power system environmental and sustainable energy management policies and procedures to an extent indicated by the following aspects:

T1 Environmental fundamentals encompassing:

- Environmental standards, codes, environmental legislation, supply authority regulations and or enterprise requirements applicable to the control of environment associated with the worksite - relevant federal legislation, relevant state/territory legislation, relevant local government by-laws, relevant government or quasi government policies and regulations, relevant community planning and development agreements (include land care agreements)
- Employer and employee responsibilities
- Methods of obtaining information on environmental issues and updates
- Methods of identifying environmental impacts from work related activities
- Meaning of environmental terms - identification, assessment and control of risks, compliance, best practice, sustainable energy.
- Procedures in implementing management plans to ensure compliance

T2 Implementation and monitoring requirements for the impact of powerline installations and operation on the environment and/or the area surrounding the powerline and/or equipment encompassing:

- Identification of relevant legislation, codes and government guidelines for the implementation and monitoring of environmental impact factors in the workplace and areas of power distribution or transmission - Commonwealth/State/Territory legislation relevant to the workplace and the Environment Protection Act legislation and common law
- Identification, assessment, control and monitoring of the hazards to the environment associated with the Powerline industry
- Workplace environment quality standards enterprise plan - setting of acceptable emission level limits from power plant equipment, impact of the enterprise activities on air and water quality, nature, impact and level of emissions from power plant, power distribution and transmission equipment and network infrastructure (noise generation, noxious gas emissions, greenhouse gas

REQUIRED SKILLS AND KNOWLEDGE

production, electromagnetic emissions, electromagnetic field strength, oil leakage, insulation breakdown products)

- Provision of manufacturers and suppliers information such as material safety data sheets (MSDSs)
- Gathering of environment management information
- Maintenance of environmental records
- Risk assessment and its management in Powerline industry
- Maintenance strategies for environment protection programs - developing processes for promoting, maintaining and improving environmental impact in the workplace and identify techniques for the evaluating and reviewing environment protection education and training programs and elements of an effective environment protection management system, EPA consultation and accident/incident investigations.

T3 Implementation and monitoring requirements for the management of sustainable energy in powerline installations and operation of plant and equipment encompassing:

- Identification of relevant legislation, codes and government guidelines for the implementation and monitoring of sustainable energy principles in the workplace, the power distribution and the transmission networks - Commonwealth/State/Territory legislation, Legislation relevant to the workplace, Environment Protection Act legislation, Local government by-laws, community planning and development agreements (i.e. land care agreements)
- Monitoring and reporting procedures for enterprise specific policy implementation on sustainable energy issues, including the gathering of energy consumption and loss information
- Ongoing development of energy conservation policy - procedures for quantifying energy usage and wastage, energy usage auditing procedures, planning of energy conservation methods, monitoring and review processes.
- Resource availability planning for policy implementation
- Techniques in managing documentation - information on applicable sustainable energy laws or other requirements; complaint records; training records; process information; process operational log books; inspection, maintenance and calibration records; relevant contractor and supplier information; incident reports; information on emergency preparedness and response.

T4 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation,

REQUIRED SKILLS AND KNOWLEDGE

complaint and issues procedures.

- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T5 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T6 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control

T7 Enterprise policies and procedures in maintaining the operation of plant, equipment and powerline installations using sustainable energy principles encompassing:

- Overview of sustainable energy technologies – solar, wind, biomass, CO2 generation
- Economic benefits of sustainable energy initiatives
- Relationship between “greenhouse effect” and sustainable energy
- Types of renewable energy technology suitable for use in Australia - photovoltaic, solar thermal, wind energy conversion, biomass, wind/tidal, gas thermal
- Relationship between safe building design and energy efficiency - building aspect, insulation, ventilation, glazing and passive solar design and shading
- Techniques in selecting control devices
- Components within a lighting system

REQUIRED SKILLS AND KNOWLEDGE

- Energy efficient lighting products, design and installation
- Use of natural light
- Automated lighting control systems
- Assessment of requirements and selection of system
- Techniques in selecting control devices
- Components within a HVAC and refrigeration control system
- Energy efficient refrigerants
- Detection systems to control air flow
- Energy star ratings for coefficient of performance
- Energy control systems
- Advantages of evaporative air conditioners in dry climates
- Assessment of requirements and selection of system

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an

extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and

- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Gather environmental management information. Implement and monitor environmental and sustainable energy policies and plans. Identify environmental impacts and assess risks. Implement and monitor the procedures for quantifying environmental impacts and controlling risks. Implement and monitor procedures for dealing with environmental incidents. Maintain environmental records, reports and plans.
B	At least one	Dealing with an unplanned event by

	occasion	drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual implementation and monitoring of environmental and sustainable energy management policies and procedures.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDNIS62 Implement and monitor the power system
A organisational OHS policies, procedures and
programs

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to implementing and monitoring environmental and sustainable energy management policies and procedures and may include the following equipment:

Environmental legislation may include relevant federal legislation; relevant state/territory legislation; relevant local government by-laws; relevant government or quasi government policies and regulations; relevant community planning and development agreements (e.g. land care agreements)

Incidents of environmental impact may include emissions to air; releases to/of water; releases to land; disposal of waste; contamination of land; impact on communities; destruction of habitat; use of energy sources; waste generation processes and technologies; extraction of water; changes to water temperature; changes to water salinity; regulation of water flow; land use; and may involve the implementation of emergency responses

Environmental management documentation may include information on applicable environmental laws or other requirements; complaint records; training records; process information; process operational log books; inspection, maintenance and calibration records; relevant contractor and supplier information; incident reports; information on emergency preparedness and response.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention

RANGE STATEMENT

- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS64A Install mobile generation set for synchronised HV Genset

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers installation of temporary portable generation sets to HV distribution assets thereby maintaining supply in accordance with industry regulations and established procedures. It encompasses the operation, connection and disconnection of a temporary portable generator and includes the estimation of HV load and assessing the appropriateness of the generator for the required outcome and networking of generators.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice**3)**

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Electrical

Common Unit Group

Unit Code

Unit Title

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. Circuits

UEENEEE105A Fix and secure electrotechnology equipment

Prerequisite Unit(s)**4)**

UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits
UETTDREL16A	Working safely near live electrical apparatus

Transmission Overhead Pathway Group

Unit Code	Unit Title
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDNIS44A	Perform HV field switching operation to a given schedule
UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTD RTP26A	Install transmission structures and associated hardware
UETTD RTP27A	Maintain transmission structures and associated hardware
UETTD RTP29A	Install and maintain transmission overhead conductors and cables

Distribution Overhead Pathway Group

Unit Code	Unit Title
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTD RDP12A	Maintain overhead energised low voltage conductors and cables

Prerequisite Unit(s)	4)	
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDNIS41A	Install network infrastructure electrical equipment
	UETTDNIS42A	Maintain network infrastructure electrical equipment
	UETTDNIS43A	Perform low voltage field switching operation to a given schedule.
	UETTDNIS52A	Install and maintain poles, structures and associated hardware
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDNIS56A	Install and maintain low voltage overhead services
	Rail Traction Pathway Group	
	Unit Code	Unit Title
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDNIS52A	Install and maintain poles, structures and associated hardware
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDNRRT21A	Install traction overhead wiring systems
	UETTDNRRT22A	Maintain traction overhead wiring systems

Prerequisite Unit(s)	4)	
	UETTDNRRT23A	Install rail traction bonds
	UETTDNRRT27A	Install overhead traction components and equipment
	UETTDNRRT28A	Maintain overhead traction components and equipment
	UETTDNRRT30A	Perform to a given schedule rail traction switching operations
	Distribution Cable Jointing Pathway Group	
	Unit Code	Unit Title
	UETTDNRJ21A	Lay ESI electrical cables
	UETTDNRJ26A	Install and maintain de-energised low voltage underground polymeric cables.
	UETTDNRJ27A	Install and maintain de-energised high voltage underground polymeric cables.
	UETTDNREL11A	Apply sustainable energy and environmental procedures
	UETTDNREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDNRIS41A	Install network infrastructure electrical equipment
	UETTDNRIS42A	Maintain network infrastructure electrical equipment
	UETTDNRIS43A	Perform low voltage field switching operation to a given schedule.
	UETTDNRIS55A	Install and maintain low voltage underground services
	Electrical Pathway Group	
	Unit Code	Unit Title

Prerequisite Unit(s)	4)	
	UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDRIS67A	Solve problems in energy supply network equipment
	UETTDRSB39A	Perform power system substation switching operation to a given schedule

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to install mobile generation set for synchronised genset HV	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
	1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
	1.4 Relevant requirements and established procedures for the work are to all personnel and

ELEMENT	PERFORMANCE CRITERIA
	identified for all work sites.
1.5	OHS policies and procedures related to the work are identified to ensure safe systems of work are followed.
1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
1.7	Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements.
2	Carry out the installation of mobile generation set for synchronised genset HV
2.1	OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
2.2	First Aid and other related work procedures are performed according to requirements and/or

ELEMENT	PERFORMANCE CRITERIA
	established procedures.
	2.3 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.
	2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
	2.6 Installation of mobile generation set for synchronised genset HV is carried out, in accordance with the work schedule and requirements and/or established procedures.
	2.7 Essential knowledge and associated skills are applied in the safe installation of mobile generation set for synchronised genset HV to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
3 Complete the installation of mobile generation set for synchronised genset HV	3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.

ELEMENT**PERFORMANCE CRITERIA**

- 3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, synchronised genset HV apparatus is returned to service and advised to client/customer in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing mobile generation set for synchronised genset HV.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS64A HV mobile generation set installation

Evidence shall show an understanding of the installation of mobile generation set for synchronised with HV supplies to an extent indicated by the following aspects:

T1 Installation of a HV mobile generation encompassing:

- Safety precautions specific to installing mobile generators - safe working policies, practices and procedures, techniques in connecting, operating and disconnecting generators, types of tools and equipment, safe use of tools and equipment.
- Techniques in the installation of generator sets - the connection of generator onto and off the network without interruption to supply, estimation of HV load.
- Assessing the appropriateness of the generator

T2 HV generator control systems encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the operation of a portable generator.
- Safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, synchronising procedures.
- Techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of HV load, assessing the appropriateness of the generator.
- Operating a generator in parallel to a single HV job - overhead systems, indoor systems, customer installations, kiosk substations.
- HV generator set and control system to HV distribution assets

T3 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker's body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements,

REQUIRED SKILLS AND KNOWLEDGE

and the practical procedure of climbing an overhead structure and fitting a pole chair

- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is

recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and

range; and

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Autonomous installation of a mobile generator set for synchronised genset HV incorporating operation, connection and disconnection of the generator Evaluating load characteristics associated with networking of generators. Synchronisation of the generator control systems onto and off the network without interruption to supply. Estimation of HV load and assessing the

		appropriateness of the generator Operating a generator in parallel to a single HV job
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation of mobile generation set for synchronised genset HV

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and

associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation of mobile generation set for synchronised genset HV and may include overhead systems, indoor systems, customer installations, Kiosk Substations, HV genset and control system associated with loads for networking generator sets.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTD RIS65A Contribute to coordinated HV live working

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit specifies the outcomes required of live line working team members to work effectively as a cohesive team to ensure safety of all team members and the community when undertaking high voltage (HV) live line work. It includes the pre-work briefing on tasks to be undertaken, roles of individual team members, identification of possible hazards, risk management analysis and implementation of palliative measures to control or mitigate the risk to acceptable levels. It also encompasses the monitoring of work performance to ensure safety, and the post-work debriefing to identify areas for continuous improvement.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice**3)**

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

There are no prerequisite competencies to this unit.

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading	3	Writing	3	Numeracy	3
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Employability Skills Information**Employability Skills****5)**

The required outcomes described in this unit of

Employability Skills

5)

competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

- | | | | |
|---|---|-----|--|
| 1 | Plan to contribute to a coordinated High Voltage Live Line work team. | 1.1 | Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination by the team. |
| | | 1.2 | Relevant requirements and established procedures for the work are communicated to all team members and identified for all work sites. |
| | | 1.3 | OHS policies and procedures related to requirements and established procedures for the working on HV live lines are obtained and confirmed for the purposes of the work to be performed and discussed among all team members. |
| | | 1.4 | Work is prioritised and sequenced following consultation with all team members to ensure safe systems of work are followed for completion within acceptable timeframes and in accordance with established procedures. |
| | | 1.5 | OHS and live line work hazards are identified, risk assessments conducted and control measures |

ELEMENT**PERFORMANCE CRITERIA**

- are identified, prioritised, implemented and documented against the work schedule, including the checking of site weather and environmental conditions to ensure that live line work can be undertaken safely.
- 1.6 Relevant live line work permits or authority for live line work are secured to coordinate the performance of work by the team according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
- 1.8 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 All team members to be engaged in the work discuss and agree, without ambiguity, on their respective roles, and possible role changes during the course of work.
- 1.12 Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the contribution to coordinated High Voltage Live Line work.	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures. In particular, established live line working procedures are strictly adhered to.</p> <p>2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures</p> <p>2.3 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices, where applicable are safely exercised according to requirements.</p> <p>2.4 Live line permits and other provisions for live line work are in place as required, in accordance with the requirements and established procedures.</p> <p>2.5 Essential knowledge and associated skills are applied in the safe contribution to coordinated High Voltage Live Line work to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.6 Work is undertaken on HV Live Line in a team environment work according to the work schedule and requirements/established procedures.</p> <p>2.7 Work is shared among all team members in a coordinated manner as discussed and agreed during pre-work briefing.</p> <p>2.8 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are discussed with team members and reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.9 Unplanned events in the maintenance of HV Live Line work are discussed among all team members and appropriate action undertaken accordingly.</p> <p>2.10 Solutions to non-routine problems are identified</p>

ELEMENT**PERFORMANCE CRITERIA**

- and actioned using acquired essential knowledge and associated skills according to requirements.
- 2.11 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
- 3 Complete the contribution to coordinated High Voltage Live Line work.
- 3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
- 3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
- 3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, High Voltage Live Line work is returned to service and advised to client/customer in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.
- 3.7 Aspects of work schedule are discussed identified via feedback with fellow team members and information on improvement forwarded to appropriate personnel according to established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of contributing to coordinated high voltage live line work.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS65A HV live working coordination

Evidence shall show an understanding of coordination role when working live on HV infrastructure to an extent indicated by the following aspects:

T1 Electrical safe working practices encompassing:

- Risk management and assessment of risk - principle and purpose of risk management, processes for conducting a risk assessment
- Hazards associated with low-voltage, extra-low voltage and high-currents - arrangement of power distribution and circuits in an electrical installations, parts of an electrical system and equipment that operate at low-voltage and extra-low voltage, parts of an electrical system and equipment where high-currents are likely.
- Risks and control measures associated with high-voltage - parts of an electrical system and equipment that operate at high-voltage, the terms 'touch voltage', 'step voltage', 'induced voltage' and 'creepage' as they relate to the hazards of high-voltage, control measures used for dealing with the hazards of high-voltage
- Optical fibre safety - coherent optical sources and joining procedures, laser safety class 3a devices or their replacement
- Risks and control measures associated with low voltage - risks associated with modifying electrical installations, fault finding, maintenance and repair, control measures before, while and after working on electrical installations, circuits or equipment, isolation and tagging-off procedures, risks and restrictions in working live, control measures for working live
- Risks and control measures associated with harmful dusts and airborne contaminants - thermal insulation, fibrous cement materials and asbestos and other fibre reinforced switchboard materials.
- Safety, selection, use, maintenance and care of test equipment - safety characteristics of electrical testing devices, safe use of electrical testing device, checks and storage methods for maintaining the safety of testing devices

T2 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on

REQUIRED SKILLS AND KNOWLEDGE

different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors

- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker's body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair
- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

T3 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules.

T4 Working safely up to the defined "safe working zone" near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker encompassing:

- Standards, guidelines/codes of practice, State/Territory/local government legislation, supply authority regulations and or enterprise requirements including relevant certification and licensing, applicable to working safely up to the defined "safe working zone" near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker
- Definitions of terminologies - 'safe working zone' 'risk assessment', 'safe approach distances zones', 'safe working distances', 'work permits', 'access authorisation permits', 'Technical standards' 'isolation procedures' and 'compliance requirements'
- OHS policies and procedures for working safely - emergency response and First

REQUIRED SKILLS AND KNOWLEDGE

Aid procedures such as CPR, roles and responsibilities of employers, employees and other parties under OHS legislation, personal protective equipment, identifying hazards, assessing and controlling OHS risks, first aid procedures, duties of a safety observer, working at heights/confined spaces, permit to work systems and isolation procedures.

- Safe application of different types of tools and equipment
- Operation of mobile plant and machinery (e.g. EWP) near live electrical apparatus
- Electricity supply infrastructure assets and voltages
- Techniques and precautions in undertaking different work functions and working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker - work functions that may be performed include, vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely near live electrical apparatus by a non-electrical worker.

T5 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T6 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers

REQUIRED SKILLS AND KNOWLEDGE

compensation and rehabilitation records and First Aid/medical records

T7 Enterprises specific specialised tools encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools - voltage detectors; polarity testers, phase rotation.
- Characteristics, capabilities and application of specialised tools for a particular job
- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
- Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
- Techniques in pre-use inspection on the serviceability of specialised tools
- Techniques in the selection, use, maintenance, and care and storage of specialised tools
- Identifying OHS hazards, assessing and controlling risks associated with their use
- Techniques for the safe use of specialised power tools

T8 Enterprise specific — teamwork high voltage live line encompassing:

- Commonwealth/State/Territory legislation, Standards, codes, supply authority regulations and or enterprise requirements associated with working on high voltage live lines
- Safety precautions working on energised live lines when working in teams - live line minimum approach distances for person and plant, Occupational Health and Safety hazards and precautions, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment, live line access authority/permit system, disabling auto-reclosing function, ensuring functioning of fault current protective devices, checking integrity of insulation prior to work commencement.
- Types and function of specialised live line working equipment and tools inspection prior to use
- Safe working policies, procedures and practices when using and operating specialised equipment and tools
- Methods of using specialised equipment and tools
- Use of safety observers
- Emergency response and rescue including First Aid etc
- Relationship and responsibilities of each team member - roles of individuals in the team, contribution to joint outcome, goals/plans and objectives of the team.
- Work team communication - techniques in effective communication, techniques in effective teamwork, dangers of ineffective teamwork.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	<p>Facilitate communication/consultation process in a HV live line work team environment.</p> <p>Contribute to pre-work briefings and securing of live line permits or authority to work in a HV live line work team environment.</p> <p>Implement OHS policies and procedures in a HV live line work team environment.</p> <p>Contribute to the work schedule in a HV live line work team environment.</p> <p>Contribute to feedback consultation on improving safe working in a HV live line work team environment.</p>
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice

using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual HV Live Line work as a team.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRDP1 Maintain energised HV distribution overhead
4A electrical apparatus (glove)

UETDRRT3 Maintain energised traction overhead electrical
3A apparatus using glove techniques

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to contributing to coordinated high voltage live line work and may include the following:

This is a common unit for all developed live line working techniques such as hot stick, gloves and barrier, or bare hand. Technical details utilising these live line techniques are covered in other respective units of competency for live line work.

HV Live Line work may include the maintenance of energised HV electrical apparatus, conductors and cables.

Work may be undertaken on ladders, insulated elevating work platforms or through the use of a work platform secured to a helicopter.

The emphasis of this unit is to foster and promote effective team work live line work to ensure safety of all team members and the community during the course of work.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation

RANGE STATEMENT

- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTD RIS66A Manage an electricity power system OHS management system

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

The competency standard is to be applied to establish, maintain and manage systematic approaches to managing OHS in the Electricity Supply Industry. It will be applied in a management context in terms of responsibility to ensure that the workplace is as far as practicable safe and without risk to employees, clients and other present visitors.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice 3)
protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government
legislation and regulations may exist that limits the age of
operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only
after competency in the following unit(s) has/have been
confirmed.

Where pre-requisite pathways have been identified. All
competencies in the Common Unit Group must be have
been completed plus all the competencies in one (1) of the
identified Pathway Unit Group(s):

There are no prerequisite competencies to this unit.

**Literacy and numeracy
skills** 4.2)

Participants are best equipped to achieve this unit if they
have reading, writing and numeracy skills indicated by the
following scales. Description of each scale is given in
Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of
competency contain applicable facets of Employability
Skills. The Employability Skills Summary of the
qualification in which this unit of competency is packaged
will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan to manage an ESI OHS management system	<p>1.1 Purpose of the OHS management system is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.2 Legislative requirements and established procedures on policies and specifications for the OHS management system are obtained or established with the appropriate personnel.</p> <p>1.3 Establish procedures and processes for identifying hazards, assessing and controlling risks as well as dealing with hazardous events.</p> <p>1.4 Work roles and tasks are allocated according to requirements and individual's competencies.</p> <p>1.5 Work is prioritised and sequenced for the most efficient outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.</p> <p>1.6 Establish and maintain appropriate participative processes with employees and their representatives in accordance with relevant industry standards consistent with enterprise procedures.</p> <p>1.7 Deal with and resolve issues raised through participation and consultation promptly and effectively in accordance with procedures for issues resolution.</p>

ELEMENT	PERFORMANCE CRITERIA
	1.8 Provide information to employees about the outcome of participation and consultation in a manner accessible to employees.
2 Manage an ESI OHS management system	2.1 OHS management system(s) decisions are made on the basis of safety and effective outcomes according to requirements and established procedures.
	2.2 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.3 Work teams are arranged to ensure planned goals are met according to established procedures.
	2.4 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
	2.5 Quality of work is monitored against personal performance agreement and established organisational and professional standards.
	2.6 Strategic plans are developed incorporating organisation initiatives as per established procedures.
	2.7 Develop workplace procedures for hazard identification, assessment and control of risks as well as dealing with hazardous events.
	2.8 Manage and maintain OHS procedures and processes as well as dealing with hazardous events according to requirements and established procedures.
	2.9 Address identification of all hazards at the planning, design and evaluation stages of any changes in the workplace to ensure that new hazards are not created by the proposed changes.
	2.10 Develop and maintain procedures for selection and implementation of risk control measures in accordance with the hierarchy of control.

ELEMENT	PERFORMANCE CRITERIA
	2.11 Identify inadequacies in existing control measures in accordance with the hierarchy of control and provide promptly resources enabling implementation of new measures.
3 Complete the management of an ESI OHS management system.	3.1 Final inspections of the OHS management systems are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
	3.2 Appropriate personnel are notified of completion and reports and completion documents are finalised.
	3.3 Reports and completion documents are submitted to relevant personnel for approval and, where applicable, statutory or regulatory approval.
	3.4 Approved copies of the OHS management systems documents are issued and records are updated in accordance with established procedures.
	3.5 OHS Training needs are identified and an OHS induction and training program developed to fulfil employee's OHS training needs as a part of the enterprise general training program.
	3.6 Training management system(s) are maintained so that individual employee's OHS training needs are easily identified, training attendance monitored and non attendance followed up.
	3.7 Monitoring systems for keeping OHS records to meet regulatory requirements are maintained according to OHS legislative arrangements including identification of patterns of occupational injury and disease within area of managerial responsibility.
	3.8 OHS system including policies, procedures and programs is assessed according to organisational aims with respect to OHS.
	3.9 Recommendations and improvements to the OHS system are developed, documented and

ELEMENT**PERFORMANCE CRITERIA**

implemented to ensure effectiveness according to established procedures.

- 3.10 Compliance with OHS legislative requirements and established procedures is assessed to ensure that legal OHS standards are maintained as a minimum.
- 3.11 Appropriate personnel are notified on the outcomes of the evaluation(s) and recommendations and completion documents are finalised/commissioned according to established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of managing an electrical supply industry OHS management system.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS66A Power system OHS management system

Evidence shall show an understanding of management of an electricity power system OHS management system to an extent indicated by the following aspects:

T1 Safe working practices and procedures for the installation of overhead distribution conductors encompassing:

- Limits of approach for personnel, vehicles, mobile plant and elevating work platforms (EWP)
- Requirements of persons prior to making bare hand contact with dead low voltage mains and apparatus
- Requirements of relevant electrical access permits necessary to allow work to be performed on low and high voltage apparatus
- Safe working practices - requirements to enable safe working on conductive poles, procedure to attach an “on-site” earthing device to de-energised low and high voltage overhead circuit.

T2 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker’s body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair
- Traffic management - purpose of traffic management and a line worker’s responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods

REQUIRED SKILLS AND KNOWLEDGE

and the precautions for personal protection when fighting small fires

- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

T3 Implementation and monitoring requirements for powerline safety encompassing:

- Identification of relevant legislation, codes and government guidelines for the implementation and monitoring of OHS in the workplace - Commonwealth/State/Territory legislation relevant to the workplace and the meaning of general duty of care under OHS legislation and common law.
- Workplace OHS enterprise plan - responsibilities of each member of the work team, review process for changing/improving OHS safety plan/standing instructions for the systematic management of OHS in the workplace.
- Relationship between the OHS committee and employees - methods used to collate and distribute/disseminate OHS information, staff development activities and legislation requirements with regards to OHS training, methods of addressing barriers such as literacy and cultural differences and provisions relating to OHS issue resolution
- Hazards associated with Powerline industry - identification of hazards in the workplace, processes used and contributing factors to a hazardous situation assessment of risks and control of OHS risks (risk management), the hierarchy of control and monitoring of risk control measures
- Risk assessment and its management in Powerline industry - principles and purposes of risk management, processes for conducting risk assessment including, risk analysis and risk evaluation activities for selecting and implementing appropriate options for eliminating or minimising risk
- Maintenance strategies for OHS programs - developing processes for promoting, maintaining and improving OHS in the workplace and identify techniques for the evaluating and reviewing OHS education and training programs and elements of an effective OHS management system, OHS consultation and accident/incident investigations

T4 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable,

REQUIRED SKILLS AND KNOWLEDGE

uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures

- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T5 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that

can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated

within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Develop OHS policies and procedures. Implement OHS policies and procedures. Maintain OHS policies and procedures. Report on the principles and practices of the management of OHS including, hierarchy of control, risk management and the impact of the

		characteristics and composition of the workforce.
B	All of the following:	Management of system approach to OHS. Management of the organisation's procedure for maintaining OHS records.
C	All of the following applications of risk management procedures:	Develop and implement organisation's procedures for identifying hazards and assessing risks. Develop and implement organisation's procedures for controlling risks. Develop and implement organisation's procedures for dealing with hazardous events. Analysis and manage risk assessment and risk control in accordance with the hierarchy of control in the workplace. Design and implement appropriate OHS management systems
D	All of the following:	Investigation into OHS training requirements, incidents and accidents with recommendations on action plan. Provide and make readily available relevant information to

		<p>the workgroup about OHS and the organisation's OHS policies, procedures and programs on an ongoing basis.</p> <p>Develop and conduct two (2) information/training sessions on current OHS issues for the workforce.</p>
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Appropriate environmental regulation and work practices.
- Appropriate organisational requirements.
- Appropriate work environment, equipment and tools.

Assessment of this competency must also be undertaken in either an actual workplace or under a simulated work environment.

Assessment must also integrate the key competencies in section 6.7 of this competency standard

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

**Method of
assessment****9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units****9.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

BSBMGT507B Manage environmental performance

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to managing an electricity supply industry (ESI) OHS management system to be performed in an ESI work environment.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Documenting detail work events, record keeping and or storage of information
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Safe design principles

RANGE STATEMENT

- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRIS67A Solve problems in energy supply network equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers determining correct operation of energy supply network electrical equipment and providing solutions as they apply to energy supply network electrical equipment.. It encompasses working safely, reading circuit and reticulation diagrams, applying logical problem solving processes from measurements and completing the necessary documentation.

Application of the Unit

Application of the Unit 2)

This unit is intended as an additional competency to relevant competencies previously acquired and is therefore not applicable to those entering work.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit require a license to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

License to practice**3)**

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Prerequisite Unit(s) 4)

UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to solve problems in energy supply network equipment.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 OHS risk control measures and procedures in preparation for the work are followed.
	1.3 The likely extent of work to be undertaken is envisaged from reports and/or discussions with appropriate person(s).
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
	1.6 Tools, equipment and testing devices needed to take measurements are obtained in accordance with established procedures and checked for correct operation and safety.
2 Solve problems in energy supply network equipment.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

ELEMENT**PERFORMANCE CRITERIA**

- | | |
|------|---|
| 2.4 | Safety hazards resulting from the reports and risk control measures devised and implemented in consultation with appropriate personnel. |
| 2.5 | Problem solving is approached methodically drawing on knowledge of energy network equipment using measured and calculated values of circuit/apparatus parameters. |
| 2.6 | Circuit/apparatus components are dismantled where necessary and parts stored to protect them against loss or damage |
| 2.7 | Circuits/components are rechecked and their operational status is confirmed. |
| 2.8 | Materials/replacement parts required to solve problems are sourced and obtained in accordance with established procedures. |
| 2.9 | Effectiveness of the repair is tested in accordance with established procedures. |
| 2.10 | Apparatus is reassembled, finally tested and prepared for return to service. |
| 2.11 | Unexpected situations are dealt with safely and with the approval of an authorised person. |
| 2.12 | Problem solving activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices. |
| 3 | Completion and report for problem solving in energy supply network equipment |
| 3.1 | OHS work completion risk control measures and procedures are followed. |
| 3.2 | Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares. |
| 3.3 | Maintenance work activities are documented in accordance with established procedures. |

Note.

Examples of documentation are component, test results, authorisations, permits, and

ELEMENT

PERFORMANCE CRITERIA

parts/component dispatch and stores records.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in energy supply network equipment in energy supply network equipment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS67A Electricity supply and reticulation

Evidence shall show an understanding of electricity supply and reticulation systems to an extent indicated by the following aspects:

T1 Generation encompassing:

- primary energy sources
- power stations
- power station output
- acts and legislation relating to generation
- renewable energy sources and techniques

T2 Transmission encompassing:

- system requirements
- principal components of a power system
- voltage levels
- grid systems
- acts/legislation relating to transmission
- future trends

T3 Distribution encompassing:

- high voltage distribution systems
- medium/low voltage distribution systems
- radial feeders
- parallel feeders
- ring main feeders
- acts/legislation relating to distribution

T4 Substations encompassing:

- purpose
- location
- layout

T5 Overhead and underground systems encompassing:

- relative merits

REQUIRED SKILLS AND KNOWLEDGE

- applications
- planning
- installation

T6 Power distribution system electrical characteristics encompassing:

- transmission and distribution systems
- inductance, capacitance and resistance

T7 Voltage problems in a power distribution system encompassing:

- low voltage
- unbalanced voltages
- voltage rises

T8 Voltage regulation encompassing:

- autotransformers with OLTC
- transformers with OLTC
- static capacitors
- load control

T9 Control of OLTC encompassing:

- regulation relays
- control circuits
- line drop compensation

T10 Power distribution system faults encompassing:

- type/classification of fault
- typical causes/effects of faults
- three-phase symmetrical fault levels
- fault level limitation

T11 Voltage surges in a power distribution system encompassing:

- lightning surges
- switching surges
- typical surge levels
- surge impedance, typical values
- significance of the system surge impedance.

T12 Metering and metered quantities encompassing:

- purpose
- energy
- maximum demand
- accuracy classes for metering systems

T13 Energy and demand meters encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- construction
- operation
- adjustments
- testing

T14 Metering circuits encompassing:

- direct metering
- instrument transformer metering

T15 Electronic metering systems and recording meters encompassing:

- types
- applications
- connections

T16 Load control encompassing:

- purpose
- methods

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full

can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UET12'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement

- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Solving problems in energy supply network equipment as described as described in 8) and including:
 - A Determining the operating parameters of existing energy supply equipment.
 - B Envisaging the likely extent of work from reports and discussion with appropriate person(s).
 - C Using methodical problem solving techniques.
 - D Solving problems efficiently.
 - E Altering an existing energy supply equipment to comply with specified operating parameters.
 - F Developing energy supply equipment to comply with a specified function and operating parameters.
 - G Determining conditions causing an existing energy supply equipment to be unsafe.
 - H Completing documentation correctly.
 - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in energy supply network equipment.

Method of assessment 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competency

development in this unit may be arranged concurrently with unit:

UEENEEG00 Solve problems in single and three phase low
6A voltage machines

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by solving problems in energy supply network equipment in:

At least one of energy supply network systems:

- distribution overhead system;
- distribution underground system;
- transmission overhead system;
- transmission underground system.

and

At least three of the following distribution/transmission equipment:

- voltage regulation equipment
- on load tap changers
- energy metering
- demand meters
- load control
- current transformers
- potential transformers

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Industry Specific Cross-Discipline Units

UETTDRIS68A Solve problems in energy supply network protection equipment and systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers determining correct operation of energy supply network protection equipment and systems and providing solutions as they apply to energy supply network protection. It encompasses working safely, reading circuit and reticulation diagrams, applying logical problem solving processes from measurements and completing the necessary documentation.

Application of the Unit

Application of the Unit 2)

This unit is intended as an additional competency to relevant competencies previously acquired and is therefore not applicable to those entering work.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit require a license to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

License to practice

3)

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Prerequisite Unit(s) 4)

UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UETTDRIS67A	Solve problems in energy supply network equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to solve problems in energy supply network protection equipment and systems.	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	OHS risk control measures and procedures in preparation for the work are followed.
		1.3	The likely extent of work to be undertaken is envisaged from reports and/or discussions with appropriate person(s).
		1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
		1.5	Sources of materials that may be required for the work are established in accordance with established procedures.
		1.6	Tools, equipment and testing devices needed to take measurements are obtained in accordance with established procedures and checked for correct operation and safety.
2	Solve problems in energy supply network protection equipment and systems.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
		2.3	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

ELEMENT	PERFORMANCE CRITERIA
	2.4 Safety hazards resulting from the reports and risk control measures devised and implemented in consultation with appropriate personnel.
	2.5 Problem solving is approached methodically drawing on knowledge of energy supply network protection equipment and systems using measured and calculated values of circuit/apparatus parameters.
	2.6 Circuit/apparatus/system components are dismantled where necessary and parts stored to protect them against loss or damage
	2.7 Circuits/components/systems are rechecked and their operational status is confirmed.
	2.8 Materials/replacement parts required to solve problems are sourced and obtained in accordance with established procedures.
	2.9 Effectiveness of the repair is tested in accordance with established procedures.
	2.10 Apparatus is reassembled, finally tested and prepared for return to service.
	2.11 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.12 Problem solving activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Completion and report for problem solving in energy supply network protection equipment and systems	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares.
	3.3 Maintenance work activities are documented in accordance with established procedures.

Note.

ELEMENT

PERFORMANCE CRITERIA

Examples of documentation are component, test results, authorisations, permits, and parts/component dispatch and stores records.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in energy supply network protection equipment and systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS68A Electrical power system protection

Evidence shall show an understanding of protection methods and devices for electrical power systems to an extent indicated by the following aspects:

T1 Protection fundamentals encompassing:

- purpose of protection
- features of a protection scheme

T2 Instrument transformers for protection encompassing:

- Operating principles
- Applications of current transformers
- Applications of voltage transformers

T3 Feeder protection encompassing:

- fuse protection
- overcurrent & earth fault
- sensitive earth fault
- unit schemes
- distance protection
- trip/close sequences for feeders
- recloser/sectionaliser systems

T4 Transformer protection encompassing:

- overheating protection
- overcurrent protection
- restricted earth fault protection
- differential protection
- oil and gas devices

T5 Busbar protection encompassing:

- types of fault
- requirements of busbar protection
- system protection
- frame-earth protection

REQUIRED SKILLS AND KNOWLEDGE

T6 Surge protection encompassing:

- voltage surges
- surge diverters
- arcing horns

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to

be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UET12'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Solving problems in energy supply network equipment as described as described in 8) and including:
 - A Determining the operating parameters of existing energy supply protection equipment and systems.
 - B Envisaging the likely extent of work from reports and discussion with appropriate person(s).
 - C Using methodical problem solving techniques.
 - D Solving problems efficiently.
 - E Altering an existing energy supply protection equipment to comply with specified operating parameters.
 - F Developing energy supply protection equipment to comply with a specified function and operating parameters.
 - G Determining conditions causing an existing energy supply protection equipment to be unsafe.
 - H Completing documentation correctly.
 - I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.

- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in energy supply network protection equipment and systems.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UETTDRIS67A Solve problems in energy supply network equipment

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by solving problems in energy supply network protection equipment and systems in:

At least one of energy supply network systems:

- distribution overhead system;
- distribution underground system;
- transmission overhead system;
- transmission underground system.

and

At least two of the following protection equipment and systems

- over-current protection
- earth fault protection
- differential protection
- oil and gas devices
- busbar protection
- surge protection
- conventional relays
- electronic relays
- reclosers / sectionalisers

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTD69A Diagnose and rectify faults in energy supply apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers diagnosing and rectifying faults in apparatus in energy supply and distribution systems. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of energy supply apparatus to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

Application of the Unit

Application of the Unit 2)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 5 level or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational

License to practice**3)**

health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology

Prerequisite Unit(s)	4)	equipment
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UETTDRIS67A	Solve problems in energy supply network equipment
	UETTDRIS68A	Solve problems in energy supply network protection equipment and systems

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged

Employability Skills

5)

will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1 Prepare to diagnose and rectify faults	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
	1.4	The extent of faults is determined from reports and other documentation and fro discussion with appropriate personnel
	1.5	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
	1.6	Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.
2 Diagnose and rectify faults	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in

ELEMENT**PERFORMANCE CRITERIA**

- strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Logical diagnostic methods are applied to diagnose energy supply apparatus faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
- 2.5 Suspected fault scenarios are tested as being the source of system problems.
- 2.6 Cause of the faults are identified and appropriately competent persons are engaged to rectify the fault where it is outside the scope of the control system.
- 2.7 Faults in the apparatus components are rectified to raise energy supply apparatus to its operation standard.
- 2.8 Apparatus is tested to verify that it operates as intended and to specified requirements
- 2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
- 2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
- 2.11 Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.

ELEMENT	PERFORMANCE CRITERIA
3 Complete and report fault diagnosis and rectification activities	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is made safe in accordance with established safety procedures.
	3.3 Rectification of faults is documented in accordance with established procedures.
	3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in energy supply apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS69A Electrical power system operations

Evidence shall show an understanding of electrical power system operations to an extent indicated by the following aspects:

T1 Control of voltage encompassing:

- Conditions leading to voltage collapse and system disintegration.
- Effects on the system of high/low volts
- Voltage control devices - voltage regulators applied to generators and synchronous phase modifiers, electromagnetic voltage regulators, series and parallel capacitors, OLTC transformers and static Var compensations (SVCs) such as saturated reactor compensations (SRs), thyristor controlled reactor compensators (TCRs), combined TCR/TSCs and the production of wave-form distorting harmonics and control devices.

T2 The importance of the location in the system of voltage control devices.

T3 The use of graphical methods to calculate the size of VAR regulating plant.

T4 Control of power encompassing:

- Base load and spinning reserve
- Regulating machines
- Rapid start plant,
- Phase shifting transformers and various forms of load shedding.
- Principles and practices of automated control of individual machines
- Stations and transmission/tie-line elements.
- Synchronising power

T5 The relationship between power and frequency encompassing:

- Limiting values
- Machine stabilising - steam by-pass, rapid valving, slip stabilisers and over speed limiting.
- Use of single pole generator CB's.
- Use of machine AVR's as angular stabilisers.
- Damped and un-damped system oscillations.
- Relationship between fault clearance times and system stability.
- Calculation of critical clearance angles based on equal area criteria.

REQUIRED SKILLS AND KNOWLEDGE

T6 Types of communication systems encompassing:

- Telephone, power line carrier, dedicated cable, microwave links and fibre optics.
- Quantities and signals to be communicated.
- Advantages and disadvantages of the various systems.
- Equipment requirements.

T7 Transient over-voltages in power systems encompassing:

- Switching and lightning overvoltages and their effect on different plant items.
- Transient over-voltage control and reduction using surge diverters, shield wires and CB are control.
- Insulation systems, insulation coordination, insulation grading in plant items, bushings and capacitor bushings.

T8 Factors leading to the generation of corona encompassing:

- Consequences of corona.
- Reduction of corona
- Conductor bundling, grading rings and conductor surface treatment.

T9 Power System Protection encompassing:

- Location of CT's in major plant items.
- Earthing principles and devices.
- Fault current control/limitation using neutral earthing compensators (NEC's), neutral point earth impedances, high conductivity shield wires and parallel feed interlocking.
- Application of different types of protection.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UET12'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Diagnosing and rectifying faults in energy supply apparatus as described in 8) and including:
 - A Applying logical diagnostic methods.
 - B Using fault scenarios to test the cause of system faults.
 - C Identifying faults and competency needed to rectify them.

- D Rectifying faults in system controls.
- E Verifying that the system operates correctly.
- F Documenting fault rectification.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and
specific
resources for
assessment** 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to diagnosing and rectifying faults in energy supply apparatus.

Method of assessment**9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units**9.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in UEENEEE101A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

Range Statement**RANGE STATEMENT**

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to diagnosing and rectifying at least four faults a control energy supply apparatus.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
 Electrical

UETTDRIS70A Diagnose and rectify faults in electrical energy distribution systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers diagnosing and rectifying faults in networks supplying electrical energy to consumers. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of energy supply and reticulation systems to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

Application of the Unit

Application of the Unit 2)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 5 level or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also

License to practice

3)

subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits

Prerequisite Unit(s)	4)	
	UEENEEE105A	Fix and secure electrotechnology equipment
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UETTDRIS67A	Solve problems in energy supply network equipment
	UETTDRIS68A	Solve problems in energy supply network protection equipment and systems
	UETTDRIS69A	Diagnose and rectify faults in energy supply apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to diagnose and rectify faults	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
	1.4 The extent of faults is determined from reports and other documentation and fro discussion with appropriate personnel
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
	1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct

ELEMENT	PERFORMANCE CRITERIA
2 Diagnose and rectify faults	operation and safety.
2.1	OHS risk control measures and procedures for carrying out the work are followed.
2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
2.3	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
2.4	Logical diagnostic methods are applied to diagnose energy supply apparatus faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
2.5	Suspected fault scenarios are tested as being the source of system problems.
2.6	Source of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is outside the scope of the control system.
2.7	Faults in the apparatus components are rectified to raise energy supply apparatus to its operation standard.
2.8	System is tested to verify that it operates as intended and to specified requirements
2.9	Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
2.10	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
2.11	Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using

ELEMENT	PERFORMANCE CRITERIA
	sustainable energy practices.
3 Complete and report fault diagnosis and rectification activities	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is made safe in accordance with established safety procedures.
	3.3 Rectification of faults is documented in accordance with established procedures.
	3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in electrical energy distribution systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS70A Electrical power distribution systems diagnostic

Evidence shall show an understanding of diagnosing faults in power distribution systems to an extent indicated by the following aspects:

T1 Distribution system overview including encompassing:

- regulatory conditions of supply and utilisation
- compliance with Australian Standards.
- reticulation system including overhead/underground, urban/rural, HV customers and high-rise building systems. The effects of industrial customers
- methods used to ensure continuity of supply.
- types of substations in current use.
- systems of distribution used, (primary and secondary)
- voltage levels, power factor, wave-form distortion and transient loading
- supply quality
- load curve profiles (residential/industrial/commercial)
- types of feeders
- distribution systems (urban, rural single-phase systems, SWER, spur, parallel and ring systems etc.)

T2 Overhead lines and installation encompassing:

- industry and safety regulations
- overhead conductors
- conductor material
- current rating factors (heating, voltage drops, power losses)
- aerial bundled cables (HV and LV)
- covered conductors - characteristics of lines and cables including the calculation of R, X and B for different arrangements of conductor. Typical values for actual lines. Transposition. Models based on line length. Voltage and line regulation
- overhead line poles
- types (wood, concrete and steel)
- installation of poles (tooling, rake, life, labelling, sinking)
- maintenance of poles – above & below ground
- pole strength and loads
- crossarms

REQUIRED SKILLS AND KNOWLEDGE

- types and standard sizes
- insulators
- insulation types
- types (pin, suspension or disc, shackle)
- creepage, necessary clearances
- arcing horns, insulator mounting
- structure types
- mechanical properties (working strength, maximum tension, limiting size)
- interpretation of stringing charts
- determination of sag (by calculations or measurement and/or tension measurement)
- sight and wave sagging, sag correction
- stays
- components, anchorage

T3 Use of design schedules encompassing:

- sample design problems - common design practice line, voltage, structure types used, line deviation, span sag, crossarms, insulators and stays wind loading and line deviation loading basic surveying
- measurement of levels, deviation angle and compass bearings
- perform survey of short distribution line extension of produce field notes

T4 Underground cables encompassing:

- cable types, ratings, core material, design considerations, cable dielectrics, insulating materials and abbreviations, electric stress, cable volt drop and volt drop calculations, cable termination, joints and installation.
- induction and eddy currents
- cable testing, cable fault location
- cable drawing

T5 Voltage regulations of feeders and associated equipment encompassing:

- terminology used: distribution system, service line, customer's terminals, customer voltage, utilisation voltage, base voltage, voltage variation and bandwidth
- voltage limits and effects of voltage variation
- causes of variation: inductance, capacitance and reactance of distribution lines, transformers
- methods of voltage control: off-load, on-load tap changers, voltage regulating relays, line drop compensation, different types of voltage regulators
- voltage profiles: principles, effect on voltage profiles, limits of voltage, voltage drops due to LV mains transformers, tapsettings feeder and service lines
- determining volt drops for components within the profile.

T6 Control of voltage. Conditions leading to voltage collapse and system

REQUIRED SKILLS AND KNOWLEDGE

disintegration. Effects on the system of high/low volts. Voltage control devices including encompassing:

- voltage regulators applied to generators and synchronous phase modifiers
- electromagnetic voltage regulators
- series and parallel capacitors
- OLTC transformers and static Var compensations (SVCs)

T7 Range of devices covered by SVCs including encompassing:

- saturated reactor compensations (SRs)
- thyristor controlled reactor compensators (TCRs)
- combined TCR/TSCs and
- production of wave-form distorting harmonics and control devices

T8 Importance of the location in the system of voltage control devices.

T9 Types of communication systems including telephone, power line carrier, dedicated cable, micro-wave links and fibre optics. Quantities and signals to be communicated. Advantages and disadvantages of the various systems. Equipment requirements.

T10 Transient over-voltages in power systems. Switching and lightning overvoltages and their effect on different plant items. Transient over-voltage control and reduction using surge diverters, shield wires and CB are control. Insulation systems, insulation co-ordination, insulation grading in plant items, bushings and capacitor bushings.

T11 The principles of operation, voltage and current range, breaking capacity and field of use of the following types of circuit breakers - bulk oil, small oil volume, air break, vacuum and SF6 (double pressure and puffer types).

T12 The types of isolators in use. Examples include duo-roll, blade and scissor type.

T13 Circuit breaker auxiliary systems encompassing:

- d.c. systems including battery types, charging and protection systems and earth fault detection systems
- SF6 conditioning, storage and handling system

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UET12'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Diagnosing and rectifying faults in electrical energy distribution systems as described in 8) and including:
 - A Applying logical diagnostic methods.
 - B Using fault scenarios to test the cause of system faults.
 - C Identifying faults and competency needed to rectify them.

- D Rectifying faults in system controls.
- E Verifying that the system operates correctly.
- F Documenting fault rectification.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to diagnosing and rectifying faults in electrical energy distribution systems.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UETTDRIS67 Solve problems in energy supply network
A equipment

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to diagnosing and rectifying at least four faults in electrical energy reticulation system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Electrical

UETTDRIS71A Diagnose and rectify faults in electrical energy supply transmission systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers diagnosing and rectifying faults in electrical energy transmission systems. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of energy supply and transmission systems to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

Application of the Unit

Application of the Unit 2)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 5 level or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also

License to practice

3)

subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits

Prerequisite Unit(s)	4)	
	UEENEEE105A	Fix and secure electrotechnology equipment
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UETTDRIS67A	Solve problems in energy supply network equipment
	UETTDRIS68A	Solve problems in energy supply network protection equipment and systems
	UETTDRIS69A	Diagnose and rectify faults in energy supply apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to diagnose and rectify faults.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
	1.4	The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.
	1.5	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
	1.6	Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct

ELEMENT	PERFORMANCE CRITERIA
	operation and safety.
2 Diagnose and rectify faults.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Logical diagnostic methods are applied to diagnose electrical energy transmission system faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
	2.5 Suspected fault scenarios are tested as being the source of system problems.
	2.6 Source of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is outside the scope of the control system.
	2.7 Faults in the system components are rectified to raise electrical energy transmission system to its operation standard.
	2.8 System is tested to verify that it operates as intended and to specified requirements.
	2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
	2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
	2.11 Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to system and the surrounding environment or services and using

ELEMENT

PERFORMANCE CRITERIA

		sustainable energy practices.
3	Complete and report fault diagnosis and rectification activities.	3.1 OHS work completion risk control measures and procedures are followed.
		3.2 Work site is made safe in accordance with established safety procedures.
		3.3 Rectification of faults is documented in accordance with established procedures.
		3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in electrical energy supply transmission systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS71A Electrical power system transmission faults

Evidence shall show an understanding of electrical power system transmission faults to an extent indicated by the following aspects:

T1 Overview of the transmission system including lines, buses, transformers and cables. Line/bus layouts including single and double switching, breaker and a half systems and HV crossing methods.

T2 The principles involved in high voltage a.c. transmission including tower types and configurations, choice of towers or poles (economic and environmental), insulator types and configuration, types of conductors, their configuration and standard nomenclature. Typical line spacing and ground clearances. Line ratings based on ambient temperature. Conductor terminating and clamping equipment including vibration damping principles and equipment.

T3 The principles involved in d.c. transmission including the economics, harmonic generation, VAR requirements and protection difficulties. Types of connections and transformer requirements. Advantages and disadvantages of d.c. transmission. Typical overseas systems. Likely (future) use in this country.

T4 The principles of operation, voltage and current range, breaking capacity and field of use of the following types of circuit breakers.

- bulk oil
- small oil volume
- air break
- air blast
- air puffer
- vacuum and
- SF6 (double pressure and puffer types).

T5 The types of isolators in use. Examples include duo-roll, blade and scissor type.

T6 Circuit breaker auxiliary systems including:

- high pressure air systems and air storage and handling processes
- d.c. systems including battery types, charging and protection systems and earth fault detection systems
- SF6 conditioning, storage and handling system

REQUIRED SKILLS AND KNOWLEDGE

T7 The characteristics of lines and cables including the calculation of R, X and B for different arrangements of conductor. Typical values for actual lines. Transposition. Models based on line length. Voltage and line regulation. The transmission of power (P) and VARs (Q).

T8 Control of voltage. Conditions leading to voltage collapse and system disintegration. Effects on the system of high/low volts. Voltage control devices including:

- voltage regulators applied to generators and synchronous phase modifiers
- electromagnetic voltage regulators
- series and parallel capacitors
- OLTC transformers and static Var compensations (SVCs)

T9 Range of devices covered by SVCs including:

- saturated reactor compensations (SRs)
- thyristor controlled reactor compensators (TCRs)
- combined TCR/TSCs and
- production of wave-form distorting harmonics and control devices

T10 Importance of the location in the system of voltage control devices

T11 Use of graphical methods to calculate the size of VAr regulating plant

T12 Types of communication systems including telephone, power line carrier, dedicated cable, micro-wave links and fibre optics. Quantities and signals to be communicated. Advantages and disadvantages of the various systems. Equipment requirements

T13 Transient over-voltages in power systems. Switching and lightning overvoltages and their effect on different plant items. Transient over-voltage control and reduction using surge diverters, shield wires and CB are control. Insulation systems, insulation co-ordination, insulation grading in plant items, bushings and capacitor bushings

T14 Factors leading to the generation of corona. Consequences of corona. Reduction of corona including conductor bundling, grading rings and conductor surface treatment

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UET12'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Diagnose and rectify faults in electrical energy supply transmission systems as described in 8) and including:
 - A Applying logical diagnostic methods.
 - B Using fault scenarios to test the source of system faults.
 - C Identifying faults and competency needed to rectify them.

- D Rectifying faults in system.
- E Verifying that the system operates correctly.
- F Documenting fault rectification.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to diagnosing and rectifying faults in electrical energy supply transmission systems.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in Unit UEENEEE101A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to diagnosing and rectifying at least four faults in a servo/stepper drive control system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Electrical

UETTDNIS72A Diagnose and rectify faults in distributed generation systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers diagnosing and rectifying faults in distributed generation systems. The unit encompasses safe working practices, interpreting diagrams and technical data, applying knowledge of energy supply and reticulation systems to logical fault finding processes, implementing fault rectification, safety and functional testing and reporting work activities and outcomes.

Application of the Unit

Application of the Unit 2)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 5 level or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational

License to practice**3)**

health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology

Prerequisite Unit(s)	4)	
		equipment
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UETTDRIS67A	Solve problems in energy supply network equipment
	UETTDRIS68A	Solve problems in energy supply network protection equipment and systems
	UETTDRIS69A	Diagnose and rectify faults in energy supply apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills

Employability Skills

5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Prepare to diagnose and rectify faults	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
		1.3	Safety hazards which have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel.
		1.4	The extent of faults is determined from reports and other documentation and fro discussion with appropriate personnel
		1.5	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
		1.6	Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety.

ELEMENT	PERFORMANCE CRITERIA
2 Diagnose and rectify faults	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
	2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
	2.4 Logical diagnostic methods are applied to diagnose distributed generation system faults employing measurements and estimations of system operating parameters referenced to system operational requirements.
	2.5 Suspected fault scenarios are tested as being the source of system problems.
	2.6 Causes of the faults are identified and appropriately competent persons are engaged to rectify the fault where it is outside the scope of the control system.
	2.7 Faults in the system components are rectified to raise distributed generation system to its operation standard.
	2.8 System is tested to verify that it operates as intended and to specified requirements
	2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.
	2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
	2.11 Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.

ELEMENT	PERFORMANCE CRITERIA
3 Complete and report fault diagnosis and rectification activities	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is made safe in accordance with established safety procedures.
	3.3 Rectification of faults is documented in accordance with established procedures.
	3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and diagnosing and rectifying faults in distributed generation systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS72A Distributed generation systems

Evidence shall show an understanding of distributed generation systems to an extent indicated by the following aspects:

T1 OHS enterprise responsibilities encompassing:

- Provisions of relevant health and safety legislation
- Principles and practice of effective occupational health and safety management
- Management arrangements relating to regulatory compliance
- Enterprise hazards and risks, control measures and relevant expertise required
- Characteristics and composition of workforce and their impact on occupational health and safety management
- Relevance of enterprise management systems to occupational health and safety management
- Analysis of working environment and design of appropriate occupational health and safety management systems
- Analysis of relevant data and evaluation of occupational health and safety system effectiveness
- Assess resources to establish and maintain occupational health and safety management systems.

T2 Distributive generation systems encompassing:

- Concept and application
- Anti-islanding control and protection
- System monitoring and load management.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Diagnose and rectify faults in distributed generation systems as described in 8) and including:
 - A Applying logical diagnostic methods.
 - B Using fault scenarios to test the cause of system faults.
 - C Identifying faults and competency needed to rectify them.

- D Rectifying faults in system controls.
- E Verifying that the system operates correctly.
- F Documenting fault rectification.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to diagnosing and rectifying faults in distributed generation systems.

Method of assessment**9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units**9.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement**RANGE STATEMENT**

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to diagnosing and rectifying at least four faults in distributed generation systems.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Electrical

UETTDNIS73A Develop engineering solutions for energy supply power transformer problems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers developing engineering solutions to resolve problems with energy supply system protection. It encompasses working safely, apply extensive knowledge of energy supply power transformer operation and their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note.

Typical transformer problems are those encountered in meeting performance requirements and compliance standards, revising a transformer operating parameters and dealing with transformer malfunctions

Application of the Unit

Application of the Unit 2)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 6 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit require a license to practice in the workplace for work involving

License to practice

3)

direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code

Unit Title

UEENEEE101A

Apply Occupational Health and Safety regulations, codes and practices in the workplace

Prerequisite Unit(s)	4)
	UEENEEE102A Fabricate, assemble and dismantle utilities industry components
	UEENEEE104A Solve problems in d.c. Circuits
	UEENEEE105A Fix and secure electrotechnology equipment
	UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits problems
	UEENEEE126A Provide solutions to basic engineering computational problems
	UEENEEG101A Solve problems in electromagnetic devices and related circuits
	UEENEEG102A Solve problems in low voltage a.c. Circuits
	UEENEEG006A Solve problems in single and three phase low voltage machines
	UEENEEG106A Terminate cables, cords and accessories for low voltage circuits
	UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits
	UETTDRIS67A Solve problems in energy supply network equipment
	UETTDRIS68A Solve problems in energy supply network protection equipment and systems
	UETTDRIS69A Diagnose and rectify faults in energy supply apparatus
	Distribution Pathway Unit Group
	UETTDRIS70A Diagnose and rectify faults in

Prerequisite Unit(s)	4)	electrical energy distribution systems
		Transmission Pathway Unit Group
	UETTDRIS71A	Diagnose and rectify faults in electrical energy supply transmission systems
		Distributed Generation Pathway Unit Group
	UETTDRIS72A	Diagnose and rectify faults in distributed generation systems

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to develop engineering solution for energy supply power transformer problems.	1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 The extent of the transformer problem is determined from performance specifications and situation reports and in consultations with relevant persons.
	1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
	1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.
2 Develop engineering solutions for energy supply power transformer problems.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Knowledge of supply power transformer arrangements, operation, device characteristics and applications are applied to developing solutions to supply power transformer problems.
	2.3 Parameters, specifications and performance requirements in relation to each transformer problem are obtained in accordance with established procedures.
	2.4 Approaches to resolving supply power transformer problems are analysed to provide

ELEMENT

PERFORMANCE CRITERIA

		most effective solutions.
	2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.
	2.6	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.
3	Test, document and implement engineering solution for energy supply power transformer problems.	
	3.1	Solutions to transformer problems are tested to determine their effectiveness and modified where necessary.
	3.2	Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed.
	3.3	Appropriately competent and qualified person(s) required to implement solutions to supply power transformer problems are coordinated in accordance with regulatory requirements and enterprise policy. (Note)
	3.4	Justification for solutions used to solve supply power transformer problems is documented for inclusion in work/project development records in accordance with professional standards.

Note: A license to practice in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing engineering solutions for energy supply power transformer problems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS73A Power transformers diagnostics

Evidence shall show an understanding of power transformers to an extent indicated by the following aspects:

T1 Transformer construction and operating principles encompassing:

- various types of lamination style and core construction used in single phase, three phase, double wound and auto transformers.
- different winding styles/types used in transformers.
- how input current is limited on no load and how power is transferred from primary to secondary when a load is connected.
- using the transformation ratio to determine an unknown quantity of V, I, VA.
- significance of nameplate data items.
- operation of a transformer under load/no load conditions.
- the reason any particular type of transformer is used in a specific application.
- safety features specified in regulatory standards with respect to transformers.
- safety features specified in regulatory standards with respect to isolating transformers.
- basic insulation resistance, continuity and winding identification tests.

T2 Transformer parameters encompassing:

- the percentage impedance of a transformer by test.
- percentage impedance of a transformer by calculation.
- the equivalent circuit of a transformer.
- calculation of voltage regulation.
- losses that occur in a transformer.
- tests to determine losses.
- efficiency and state typical values.
- the all day efficiency of a transformer.

REQUIRED SKILLS AND KNOWLEDGE

T3 Cooling methods encompassing:

- methods of natural and forced cooling.
- properties of transformer oil.
- tests performed on transformer oil.
- auxiliary equipment
- the purpose and operation of the types of auxiliary equipment used on transformers - bushings, explosion vents, surge diverters, tap changers, conservator, breathers and desiccants, gas relays, temperature indicators.

T4 Instrument transformers encompassing:

- construction of current transformers.
- uses and ratings of current transformers.
- construction of voltage transformers.
- uses and ratings of voltage transformers.
- safety techniques when using instrument transformers.

T5 Transformer connections encompassing:

- vector group of a transformer from a connection diagram.
- connections of a three-phase transformer to create a particular vector group.
- reasons for using the different vector groups.
- purpose of tertiary windings.
- consequences/effect of an incorrect connection.

T6 Parallel operation encompassing:

- polarity markings for the windings of a transformer.
- conditions/restrictions for parallel operation of transformers.
- calculation of loading on transformers operating in parallel.
- connection of transformers in parallel to supply a common load.
- the consequences/effect of an incorrect connection.

T7 Harmonics in transformers encompassing:

- how harmonics are generated in transformers.
- problems caused by harmonics in transformers.
- measurement of the harmonics in a transformer.
- methods/equipment used to overcome harmonics in transformers.

T8 High voltage isolation encompassing:

- the term high voltage.
- procedures for isolating high voltage apparatus.
- regulations with respect to access permits.
- clearances to be observed with respect to high voltages up to 33 kV.
- the term 'step' and 'touch' potential.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment

instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UET12'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Develop engineering solutions for energy supply power transformer problems as described in 8) and including:
 - A Understanding the extent of the transformer problems.
 - B Forming effective strategies for solution

development and implementation.

- C Obtaining transformer parameters, specifications and performance requirements appropriate to each problem.
- D Testing and solutions to transformer problems.
- E Documenting instruction for implementation of solutions that incorporate risk control measure to be followed.
- F Documenting justification of solutions implemented in accordance with professional standards.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved

industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to developing engineering solutions for energy supply power transformer problems.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UETTDRIS70 Diagnose and rectify faults in electrical energy
A supply distribution system

OR

UETTDRIS72 Diagnose and rectify faults in distributed
A generation systems

OR

UETTDRIS71 Diagnose and rectify faults in electrical energy
A supply transmission system

AND

UEENEEG149 Solve problems in complex polyphase power
A circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE101A and other discipline specific occupational

health and safety unit(s) shall be reassessed in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing engineering solution for at least four supply power transformer problems.

Note.

Typical transformer problems are those encountered in meeting performance requirements and compliance standards, revising a transformer operating parameters and dealing with transformer malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Electrical

UETTDNIS74A Develop engineering solutions for energy supply system protection problems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers developing engineering solutions to resolve problems with energy supply system protection. It encompasses working safely, apply extensive knowledge of energy supply system protection operation, protection devices and their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives.

Note:

Typical protection problems are those encountered in meeting performance requirements and compliance standards, revising a protection operating parameters and dealing with protection malfunctions.

Application of the Unit

Application of the Unit 2)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 6 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit require a license to practice in the workplace for work involving

License to practice

3)

direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code

Unit Title

UEENEEE101A

Apply Occupational Health and Safety regulations, codes and practices in the workplace

Prerequisite Unit(s)	4)	
	UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
	UEENEEE104A	Solve problems in d.c. Circuits
	UEENEEE105A	Fix and secure electrotechnology equipment
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDRIS67A	Solve problems in energy supply network equipment
	UETTDRIS68A	Solve problems in energy supply network protection equipment and systems
	UETTDRIS69A	Diagnose and rectify faults in energy supply apparatus
	Distribution Pathway Unit Group	
	UETTDRIS70A	Diagnose and rectify faults in electrical energy distribution

Prerequisite Unit(s) 4)

systems

Transmission Pathway Unit Group

UETTDRIS71A Diagnose and rectify faults in electrical energy supply transmission systems

Distributed Generation Pathway Unit Group

UETTDRIS72A Diagnose and rectify faults in distributed generation systems

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to develop engineering solution for energy supply system protection problems.	1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 The extent of the protection problem is determined from performance specifications and situation reports and in consultations with relevant persons.
	1.4 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
	1.5 Effective strategies are formed to ensure solution development and implementation is carried out efficiently.
2 Develop engineering solution for energy supply system protection.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Knowledge of supply system protection arrangements, operation, device characteristics and applications are applied to developing solutions to supply system protection problems.
	2.3 Parameters, specifications and performance requirements in relation to each protection problem are obtained in accordance with established procedures.
	2.4 Approaches to resolving supply system protection problems are analysed to provide

ELEMENT

PERFORMANCE CRITERIA

		most effective solutions.
	2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.
	2.6	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.
3	Test, document and implement engineering solution for energy supply system protection problems.	
	3.1	Solutions to protection problems are tested to determine their effectiveness and modified where necessary.
	3.2	Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed.
	3.3	Appropriately competent and qualified person(s) required to implement solutions to supply system protection problems are coordinated in accordance with regulatory requirements and enterprise policy. (Note)
	3.4	Justification for solutions used to solve supply system protection problems is documented for inclusion in work/project development records in accordance with professional standards.

Note:

A license to practice in the workplace is required for work involving direct access to plant and equipment connected to installation wiring at voltages above 50 V a.c. or 120 V d.c.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing engineering solutions for energy supply system protection problems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS74A Electrical power system protection diagnostic

Evidence shall show an understanding of diagnosing faults in electrical power system protection to an extent indicated by the following aspects:

T1 Protection scheme requirements encompassing:

- Requirements of a protection scheme - relationship to primary system design, purpose of protection, safety of persons, protection of plant, system instability, system break up, loss of customers, loss of revenue, protection zones, restricted schemes, unrestricted schemes, duplicate protection, local backup protection, remote backup protection, selectivity, discrimination, stability, sensitivity, reliability
- Components of a protection scheme - current transformers, potential transformers, summation current transformers, interposing transformers, multi-tapped transformers, all-or-nothing relays, induction relays, balanced beam relays, directional relays, biased relays, solid state relays, microprocessor based relays, gas relays, thermal sensors, hardwired communication, powerline carriers systems, microwave systems, fibre optic systems, need for isolation, need for interfacing
- Protection applied to buses - overload, differential, earth leakage, structure leakage, combined schemes, protection overlap
- Protection applied to transformers - biased differential, gas, winding temperature, oil temperature
- Protection applied to single/radial lines - overcurrent, earth leakage, slow earth leakage, distance, auto reclose, sectionalising, over voltage
- Protection applied to interconnected lines - overcurrent, pilot wire, directional, directional overcurrent, current differential, phase comparison, current comparison, distance, impedance, admittance, offset

T2 Discrete protection systems encompassing:

- Earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination, backup protection
- Overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination, backup protection

REQUIRED SKILLS AND KNOWLEDGE

- Alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, over temperature schemes

T3 Interdependent protection systems encompassing:

- Overcurrent and earth leakage intertripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic, shading coils
- Pilot wire, phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme, pilot supervisory techniques,
- Load shedding, voltage control, parallel operation, load rejection
- CB failure protection
- Reclose systems - applications, single shot, multishot, blocking schemes, synchronisation checking

T4 Complex protection systems encompassing:

- Distance - characteristics, electromechanical, electronic, impedance, mho, offset mho, switched schemes, non-switched schemes, blocking schemes, bus zone
- Differential, transformer differential, bus overcurrent - principles, feeder protection, transformer protection, bias systems, harmonic restraint, CT connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, CT connections, special considerations, digital systems
- Types of revenue metering
- Applications of SCADA
- Complex protection systems for communications
- Harmonic control
- Point on wave switching

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UET12'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Develop engineering solutions for energy supply system protection problems as described in 8) and including:
 - A Understanding the extent of the protection problem.
 - B Forming effective strategies for solution development and implementation.
 - C Obtaining protection parameters, specifications and performance requirements appropriate to each

problem.

- D Testing and solutions to protection problems.
- E Documenting instruction for implementation of solutions that incorporate risk control measure to be followed.
- F Documenting justification of solutions implemented in accordance with professional standards.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to developing engineering solutions for energy supply system protection problems.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UETTDRIS70A Diagnose and rectify faults in electrical energy distribution system
OR

UETTDRIS72A Diagnose and rectify faults in distributed generation systems
OR

UETTDRIS71A Diagnose and rectify faults in electrical energy supply transmission system
OR

UEENEEG149A Solve problems in complex polyphase power circuits

The critical aspects of occupational health and safety covered in Unit UEENEEE101A and other discipline specific occupational health and safety unit(s) shall be reassessed in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing engineering solution for at least four supply system protection problems.

Note.

Typical protection problems are those encountered in meeting performance requirements and compliance standards, revising a protection operating parameters and dealing with protection malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Electrical

UETTDRIS81A Install telecommunications infrastructure on electricity supply industry assets

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This Competency Standard Unit covers the installation of telecommunications infrastructure equipment within the communications corridor, such as cables, cable support, termination enclosures, which are relevant to the transmission of data. It includes the termination/connection of the telecommunication equipment in accordance to enterprise requirements.

Application of the Unit

Application of the Unit

2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of telecommunication work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety,

License to practice

3)

electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

4.1) Competencies

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UETTDREL14A	Working safe near live electrical apparatus as a non-electrical worker

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the

following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements: Elements describe the essential outcomes of a unit of competency

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the installation of telecommunications infrastructure equipment	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received.
	1.2 Relevant requirements and established procedures for the work are communicated to relevant personnel and identified for the work site.
	1.3 OHS policies and procedures related to requirements and established procedures for the installation of telecommunications infrastructure equipment are obtained and confirmed for the purposes of the work to be performed.

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|---|--|
| | 1.4 | Work is prioritised and sequenced following consultation with supervisor for completion within acceptable timeframes and in accordance with established procedures. |
| | 1.5 | Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored according to established procedures. |
| | 1.6 | Relevant work permits are received to access and perform work according to requirements and/or established procedures. |
| | 1.7 | Resources including equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order. |
| | 1.8 | Relevant personnel at worksite are confirmed with currency in First Aid, Pole Top Rescue and other related work procedures according to requirements. |
| | 1.9 | Site is prepared in accordance with established procedures to minimise risk and damage to property, commerce, and individuals. |
| 2 | Carry out installation of telecommunications infrastructure equipment | |
| | 2.1 | OHS and sustainable energy principles and practices to reduce waste are monitored and followed in accordance with requirements and/or established procedures. |
| | 2.2 | Lifting, climbing, working at heights, and use of power tools/equipment, techniques and practices are safely followed. |
| | 2.3 | Essential knowledge and associated skills are applied to the safe installation of telecommunications infrastructure equipment to ensure completion in an agreed timeframe, to quality standards with a minimum of waste according to requirements. |
| | 2.4 | Telecommunications infrastructure equipment and associated hardware is positioned, secured and terminated/connected in accordance with requirements and established procedures. |

ELEMENT	PERFORMANCE CRITERIA
	2.5 Telecommunications infrastructure equipment and associated hardware is maintained in accordance with requirements and established procedures.
	2.6 Unplanned events in the installation of telecommunications infrastructure equipment are resolved and dealt with.
	2.7 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.8 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the installation of telecommunications infrastructure equipment	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing telecommunications infrastructure equipment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS81A Telecommunication network installations

Evidence shall show an understanding of telecommunication network installations to an extent indicated by the following aspects:

T1 Telecommunication network drawings and plans

T2 OHS specific requirements for telecommunication networks encompassing:

- Aerial safety equipment
- Procedure to applying pole top rescue

T3 Hazard identification associated with telecommunication networks equipment encompassing:

- Working at height
- Checking exposed metal for potential differences
- Hazard and control measures in aerial cabling working environment
- Soundness of pole for aerial cabling
- Hazards associated with working with optical fibre.

T4 Aerial construction methods and regulations

T5 Telecommunication network cables encompassing:

- Types of cables
- Cable colour coding for outdoor cable
- Colour coding of cables and termination modules and standard connectors used with twisted pair, optical fibre and coaxial cables
- Cable labelling devices

T6 Cables protect and support requirements encompassing:

- protection against mechanical damage,
- protection from adverse temperatures and corrosion and
- protection from magnetic field that may affect the performance of the cable.
- Cable support and protection devices, accessories and typical applications (metallic and non-metallic conduits, duct and trunking, cable ladder and tray, cable clips and ties and related accessories).

T7 Installation techniques encompassing:

- Cable installation equipment

REQUIRED SKILLS AND KNOWLEDGE

- Cable drawing and hauling techniques
- T8 Insulation removal and replacement
- T9 Conductor handling and cable terminations encompassing:
- Application of connecting devices for conductors and terminals
 - Stress release on cables/conductors.
 - Methods of terminating cables (cables less than twenty pair, twenty pair cable and greater)
 - Joining of an aerial cables
- T10 Operating principles of fibre optic cable transmission encompassing:
- Types of optical fibre types available for telecommunications voice and data transmission.
 - Difference between multimode and single mode transmission.
 - Advantages of optical fibre cable compared to other cables.
 - Applications of optical fibre cables.
 - Requirements of optical fibre cables as specified in current Standards
- T11 Installation techniques for optical fibre cables encompassing:
- Regulations, standards and codes applicable to optical fibre installation
 - Bending radii and hauling requirements.
 - Cable support and securing mechanisms
 - Safety precautions.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for

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apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET09”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control

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measures as specified in the Performance Criteria and range; and

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Any two of the following:	Cable support Support brackets Junction boxes Enclosures
B	Any two of the following:	Ribbon optical fibre cable Single mode optical fibre cable Multi mode optical fibre cable Structured aerial cabling
C	At least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate

EVIDENCE GUIDE

		solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation of telecommunications infrastructure equipment.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation, termination/connection of overhead telecommunications infrastructure cabling and equipment relevant to the national broadband networks for the transmission and distribution of data.

Telecommunications infrastructure equipment and associated hardware may include relevant transmission or distribution cabling networks; cables, splices, lead-in cables, junction boxes, enclosures, cable support, support brackets.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Quality assurance systems
- Requirements
- Work clearance systems

Unit Sector(s)

Not Applicable

2.2) Literacy and numeracy skills

2.2) Literacy and numeracy skills

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"

Reading	3	Writing	3	Numeracy	3
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Competency Field

Competency Field 11)

Industry Specific Cross-Discipline Units

UETTDRIS99A Test and Verify Distribution Remote Area Installations

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers inspection and testing to verify whether a distribution remote area installation is safe and complies with all requirements. It encompasses working safely, visual inspections and mandatory, optional and functional test procedures, identifying non-compliance defects and mandatory reporting requirements.

Application of the Unit

Application of the Unit 2)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit require a license to practice in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various

License to practice**3)**

jurisdictions and typically relates to the access to High Voltage and Low Voltage distribution remote area installations, operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment.

2. Compliance may be required in various jurisdictions relating to currency in ESI Rescue Procedures, CPR/First Aid, confined space, lifting and risk safety measures.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE103A	Solve problems in extra-low voltage, single path circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to

Prerequisite Unit(s)	4)	
		control OHS risks associated with electrotechnology work
	UEENEEK101A	Maintain safety and tidiness of remote area power supply systems
	UEENEEK102A	Work safely with remote area power supply systems
	UEENEEK116A	Maintain and repair remote area power generation facilities
	UEENEEK120A	Maintain operation remote area power plant
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDNIS32A	Solve electrical problems in remote community network apparatus
	UETTDNIS33A	Solve electrical problems in remote community network systems

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the

Employability Skills

5)

qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Prepare to visually inspect, test and verify remote area distribution installation.	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites
		1.3	OHS policies and procedures related to requirements and established procedures for accessing, testing and verification of overhead distribution installations are obtained and confirmed for the purposes of the work to be performed and communicated.
		1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
		1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures

ELEMENT	PERFORMANCE CRITERIA
1.6	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
1.7	Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
1.8	Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
1.10	Specialist test and measurement equipment for testing and verification of overhead distribution installations are obtained, inspected and confirmed in working order and calibrated as per requirements and established procedures
1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
1.12	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures
1.13	Road signs, barriers and warning devices are positioned in accordance with requirements.
2 Carry out visual inspection, test and verification of remote area distribution installation.	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working in confined spaces and aloft, use of power tools/equipment, test

ELEMENT**PERFORMANCE CRITERIA**

- equipment, test and measurement equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Essential knowledge and associated skills are applied in the inspection, safe access, testing and verification of overhead distribution installations to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.4 Remote area distribution installations and associated hardware is visually inspected and confirmed as positioned, secured and terminated/connected in accordance with requirements and established procedures.
- 2.5 Energised tests and/or measurements, if required, to verify remote area distribution installations is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.6 Remote area distribution installations is checked for suitability and conformance with organisational construction standards and electrical network supply standards
- 2.7 Remote area distribution installation protection methods and devices are validated as meeting organisational construction and distribution protection standards.
- 2.8 Remote area distribution installation switchgear is validated as being appropriately rated and meeting functional requirements of organisational construction and distribution network protection standards
- 2.9 Remote area distribution installations earthing system and MEN system components are verified as correctly installed and conforming to organisational construction and distribution network standards.
- 2.10 Mandatory tests are conducted to verify that remote area distribution installation:

ELEMENT**PERFORMANCE CRITERIA**

		Distribution system phasing, phase rotation and polarity is correct and conform to network construction standards.
		Electrical distribution network voltage levels comply with network supply standards.
		Potential present upon distribution network neutral conductors conform network supply standards.
	2.11	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.12	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.13	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3	Report inspection and test findings.	3.1 OHS risk control work completion measures and procedures are followed.
		3.2 Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies corrected/ reported in accordance with established procedures.
		3.3 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
		3.4 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
		3.5 Non-compliance defects are identified, corrected and/or reported in accordance with established procedures.
		3.6 Recommendations for rectifying defects are made in accordance with established procedures.
		3.7 Mandatory documentation is completed in accordance with established procedures.

ELEMENT**PERFORMANCE CRITERIA**

- 3.8 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.9 Relevant work permit(s) are signed off and, electrical equipment (network infrastructure) are returned to service in accordance with requirements.
- 3.10 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing electrical equipment (network infrastructure).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TIS99A Remote area distribution installations -testing and verification

Evidence shall show an understanding of remote community distribution installations testing and verification to an extent indicated by the following aspects:

T1 Legislated regulations encompassing:

- legislation and regulations that require installations and equipment to be tested to ensure they are safe.
- the person/bodies responsible for the various aspects of ensuring distribution overhead installations are safe.
- results of tests that show an distribution remote area installation is safe for connection to the supply.
- results of periodic inspection and tests that show construction site wiring and equipment is safe to use.
- results of periodic inspection and tests that show the distribution remote area installations electrical equipment are safe to use.

T2 Testing installations encompassing:

- Distribution system phasing, phase rotation and polarity is correct and conform to network construction standards.
- Electrical distribution network voltage levels comply with network supply standards.
- Potential present upon distribution network neutral conductors conform network supply standards.
- insulation resistance is adequate
- Earthing system and MEN system components are verified as correctly installed

T3 Documentation encompassing:

- results of tests conducted on a distribution remote area installation in accordance with work package requirements and ensure the distribution installation is safe.
- documents of periodic inspection and testing of distribution remote area installation and equipment in accordance with requirement.
- Non-compliances and defects reported in accordance with established procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships.

However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment

Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Before the critical aspects of evidence are considered all prerequisites shall be met. Evidence for competence in this unit shall be considered holistically.

Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables

Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Any one of the following:	Poles and structures Overhead conductors/cables Underground/overhead transition points
B	At least three of the following	Voltage detector* Clamp-on ammeter Multimeter Polarity tester Insulation resistance tester Phase sequence indicator* Earth resistance tester Recording meters (*must do)
C	At least three of the following	Distribution network voltage test* Neutral identification test* Earthing system resistance test Distribution system load current test MEN System loop impedance test/continuity test Phase sequence test (*must do)
D	At least two of the following	EWP Ladder Portable platform

E	At least two of the following	Insulating mats Temporary bridging device Insulating gloves Ladder/pole shrouds Equipotential bonding Earthing and short circuiting
F	Any one of the following:	Fuse switches Dropout fuses Disconnectors Links Fuses Surge arrestors
G	Any one of the following	Open wire overhead conductor ABC/CCT* Low voltage services (*must do)
H	Any one of the following:	Transformers Reactors Regulators

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Network construction standards
- Network supply standards
- Suitable work environment, facilities, equipment and materials to undertake actual installation of electrical equipment in a network infrastructure.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working aloft (upon pole/structure or from EWP), below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the inspection, test and verification of overhead distribution installations and includes pre-commissioning.

Distribution network installations and associated hardware may include relevant distribution line/network; Low Voltage services, Low Voltage conductors, High Voltage conductors, switchgear (e.g. reclosers, sectionalisers, drop-out fuses, disconnectors, isolators, air break switches, gas filled switches, links, fuses, fuse switches and circuit breakers); transformers (e.g. padmount, pole-mounted and mobile); reactors; fault indicators; regulators; connections of street lighting control points; capacitors; cables; underground/overhead cable terminations; mobile generators and surge arrestors; support brackets and the like.

It does not include the energisation of equipment in a highly complex, interdependent and interconnected electricity supply Network system, where the affects of unintended consequences on the system are high risk and appropriate personnel effect energisation.

Test and recording equipment includes voltage detectors, phasing equipment, tong ammeters, voltmeters, recording meters and insulation resistance testers used for the purposes as intended and according to requirements

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Pre-commissioning testing and measurement
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures

RANGE STATEMENT

- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Network construction standards
- Network supply standards
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRRF01B Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the knowledge and application of Electricity Supply Industry (ESI) safety rules and codes of practice for work on or near electrical apparatus it includes the application of relevant State and Territory safety rules, codes of practice and enterprise based procedures and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for, health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Application of the Unit

Application of the Unit 2)

This competency standard unit shall be selected as part of an endorsed skill set for the purposes of refresher training and/or to meet regulatory and/or network requirements.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

ESI employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All

Prerequisite Unit(s) 4)

competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

There are no prerequisite competencies to this unit.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

This unit contains employability skills

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus	1.1 Relevant safety rules, codes of practice and procedures are identified and obtained
	1.2 Hazards and risk control measures for specific work functions/areas are identified and obtained.
	1.3 The requirement for access authority/work permits required for work are identified and obtained from appropriate personnel according to established procedures.
	1.4 Safety systems and equipment for work are prepared and placed to minimise and control hazards in accordance with established procedures
2 Carry out application of ESI safety rules, codes of practice and procedures for work on or near electrical apparatus	2.1 Workplace procedures and work instructions for controlling risk are followed.
	2.2 Safety rules, codes of practice and workplace procedures for induction to a worksite, are followed.
	2.3 Specific workplace systems and equipment isolation procedures are followed.
	2.4 Restricted workplace areas are identified including ingress and egress procedures.
	2.5 Emergency procedures are identified including assembly areas, communication systems including audible alarms and processes according to established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the application of ESI safety rules, codes of practice and procedures for work on or near electrical apparatus	3.1 Processes for completing work are applied, access authority/work permits where required are completed in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of the application of ESI safety rules, codes of practice and procedures for work on or near electrical apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRF01B ESI safety rules, codes of practice and procedures for work on or near electrical apparatus

Evidence shall show an understanding of ESI safety rules, codes of practice and procedures for work on or near electrical apparatus to an extent indicated by the following aspects:

T1 Working on or near electrical network infrastructure encompassing:

- Identifying documentation, procedures and instructions for work on or near electrical apparatus
- Identify and assessing hazards and control measures
- Knowledge of Safe Approach Distances (SAD's) for work on or near electrical apparatus

T2 Maintaining SAD's for work on or near electrical apparatus

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

In accordance with the National Refresher Training Recognition Protocol for the Electricity Supply Industry, this unit is identified as a Refresher Training unit and is only available for use by industry to meet industry protocols and regulatory requirements.

Industry has defined Refresher Training as:

“A competency confirmation event which may include training, the purpose of which is to compensate for or prevent deterioration in a previously achieved standard of performance”

Under the protocol and the applicable State or Territory legislative and regulatory requirements, Electricity Supply Industry employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Industry accepts that opportunities to practice emergency procedures are generally restricted to simulated exercises in a controlled environment during competency confirmation programs.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments.

An industry endorsed Learning Assessment Plan (LAP) has been developed to support this unit.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated at each competency confirmation event.

- In accordance with State and Territory regulations and the “Assessment Guidelines – UET12”. Evidence shall also comprise:
 - A performance demonstrated within the timeframes typically expected of the procedure. In particular the assessment of this unit shall confirm that a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum	Item List

	number of items on which skill is to be demonstrated	
A	All, to the satisfaction of the assessor	Application of Safe Approach Distances to Personnel Vehicles Insulated mobile plant Non insulated mobile plant

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual application of ESI safety rules, codes of practice and procedures for work on or near electrical apparatus in the workplace.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and

demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with UETTDRRF09B Apply access procedures to work on or near electrical network infrastructure

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the application of ESI safety rules, codes of practice and procedures for work on or near electrical apparatus and may include the following:

Applying work procedures and instructions as they apply to risk control and personal safety measures.

Participation in consultation processes, identifying hazards and implementing and monitoring control measures at the work site.

Application of minimum approach distances for personnel, vehicles and insulated/non insulated mobile plant.

Application of access procedures and or permit systems. (access authority/access permit/work permit)

Laying out and delineating a work area within a high risk work environment.

Application of control measures for spurious currents and voltages in inductive environments.

Work within electric and magnetic fields

It may also include the application of control measures to create equipotential work areas,

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification

RANGE STATEMENT

- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Refresher Training Unit.

UETTDRRF02B Perform pole top rescue

Modification History

Release	Action		Details	Points
	Update	Pre-requisite	HLTAID001 Provide cardiopulmonary resuscitation	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the performance of pole top rescue procedures as an emergency procedure required in the work place. It specifies the mandatory requirements of rescue from a pole top and how they apply in the context of transmission, distribution and rail work functions. It encompasses responsibilities for rescue, health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Application of the Unit

Application of the Unit 2)

This competency standard unit shall be selected as part of an endorsed skill set for the purposes of refresher training and/or to meet regulatory and/or network requirements.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational

health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

ESI employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been

Prerequisite Unit(s) 4)

confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Common Unit Group

Unit Code	Unit Title
HLTAID001	Provide cardiopulmonary resuscitation

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

This unit contains employability skills

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to perform pole top rescue	1.1 Instruction in hazards and risk control measures for specific work functions and work areas are identified and obtained. (This will include the risk assessment and control measures taken by the individual performing the rescue).
	1.2 Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures.
2 Carry out pole top rescue.	2.1 Workplace procedures and work instructions for controlling risk are followed.
	2.2 Workplace procedures for accessing the pole top and removing the victim where necessary from contact with live apparatus.
	2.3 Workplace procedures for attaching the emergency lowering equipment and lowering the victim to the ground are followed.
	2.4 Workplace procedures for carrying out CPR, if required, at the site and treatment where necessary by medical professionals are followed.
	2.5 The worksite is secured and entry controlled until appropriate authorities inspect and release the site.
3 Complete the pole top rescue procedure	3.1 Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of pole top rescue equipment and procedures.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRF02B Pole Top Rescue

Evidence shall show an understanding of pole top rescue to an extent indicated by the following aspects:

T1 Emergency procedures for the pole top rescue of a victim encompassing:

- Inspection of rescue equipment
- Assessing hazards to rescuer, victim and others
- Isolation procedures where appropriate
- Knowledge of Safe Approach Distances (SAD's) appropriate to Pole Top Rescue
- Involvement of external emergency services

T2 Emergency procedures for the skills for the pole top rescue of a victim encompassing:

- Placement of rescue equipment
- Controlling hazards to rescuer, victim and others
- Maintaining Safe Approach Distances (SAD's) appropriate to Pole Top Rescue
- Practical demonstration of rescuing a person
- Removing victim to safe location / place of safety

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

In accordance with the National Refresher Training Recognition Protocol for the Electricity Supply Industry, this unit is identified as a Refresher Training unit and is only available for use by industry to meet industry protocols and regulatory requirements.

Industry has defined Refresher Training as:

“A competency confirmation event which may include training, the purpose of which is to compensate for or prevent deterioration in a previously achieved standard of performance”

Under the protocol and the applicable State or Territory legislative and regulatory requirements, Electricity Supply Industry employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Industry accepts that opportunities to practice emergency procedures are generally restricted to simulated exercises in a controlled environment during competency confirmation programs.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments.

An industry endorsed Learning Assessment Plan (LAP) has been developed to support this unit.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated at each competency confirmation event.

- In accordance with State and Territory regulations and the “Assessment Guidelines – UET12”. Evidence shall also comprise:
 - A performance demonstrated within the timeframes typically expected of the rescue procedure. In particular the assessment of this unit shall confirm that a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment.
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All, to the satisfaction of the	Inspection and placement of rescue

	assessor:	equipment
B	All, to the satisfaction of the assessor	Perform pole top rescue in accordance with workplace procedures

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to organisational rescue practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual performance of pole top rescue procedures in the workplace.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in a realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to performing pole top rescue procedures in the workplace and will include the following:

Applying work procedures and instructions as they apply to risk control and personal safety measures.

Inspection and placement of rescue equipment to facilitate a prompt response and rescue from an incident at the pole top.

Applying rescue procedures as applicable to poles which may include; wood, spun concrete, steel/concrete, steel, and composites with cross arms which may include; wood, steel, and composites.

Accessing the pole top and placing, securing and attaching the rescue equipment/lowering device to the victim in accordance with workplace procedures.

Removing the victim from contact with any live conductors/apparatus where necessary in accordance with workplace procedures.

Lowering the victim to the ground and performing CPR if required in accordance with workplace procedures.

Facilitating treatment by medical professionals when and where required

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Assessing risk
- Assessment
- Authorisation
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Requirements
- Rescue Equipment Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Refresher Training Unit.

UETTDRRF03B Perform EWP rescue

Modification History

Release	Action		Details	Points
	Update	Pre-requisite	HLTAID001 Provide cardiopulmonary resuscitation	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the performance of rescue procedures from an Elevating Work Platform (EWP) in the work place. It specifies the mandatory requirements of rescue from a raised EWP by a work party member on the ground and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for, health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Application of the Unit

Application of the Unit 2)

This competency standard unit shall be selected as part of an endorsed skill set for the purposes of refresher training and/or to meet regulatory and/or network requirements.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

ESI employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Common Unit Group

Unit Code	Unit Title
HLTAID001	Provide cardiopulmonary resuscitation

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading	3	Writing	3	Numeracy	3
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Employability Skills Information

Employability Skills 5)

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to perform EWP rescue procedures	<p>1.1 Instruction in hazards and risk control measures for specific work areas and work activities are identified and obtained. (This will include the risk assessment and control measures taken by the individual performing the rescue).</p> <p>1.2 Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures.</p>
2 Carry out EWP rescue procedure.	<p>2.1 Workplace procedures and work instructions for controlling risk are followed.</p> <p>2.2 Workplace procedures for removing the victim, where necessary, from contact with or in vicinity of live apparatus and lowering the EWP to the ground are followed.</p> <p>2.3 Workplace procedures for removing the victim from the EWP are followed.</p> <p>2.4 Workplace procedures for carrying out CPR if required at the site and treatment where necessary by medical professionals are followed.</p> <p>2.5 The worksite is secured and entry controlled until appropriate authorities inspect and release the site.</p>
3 Complete the EWP rescue procedure	<p>3.1 Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of performing EWP rescue procedure.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRF03B EWP Rescue

Evidence shall show an understanding of EWP rescue to an extent indicated by the following aspects:

T1 Emergency procedures for the EWP rescue of a victim encompassing:

- Inspection of rescue equipment
- Assessing hazards to rescuer, victim and others
- Isolation procedures where appropriate
- Knowledge of Safe Approach Distances (SAD's) appropriate to EWP Rescue
- Involvement of external emergency services
- Emergency retrieval systems

T2 Emergency procedures for the skills required to undertake EWP rescue of a victim encompassing:

- Placement of rescue equipment
- Controlling hazards to rescuer, victim and others
- Maintaining Safe Approach Distances (SAD's) appropriate to EWP Rescue
- Practical demonstration of rescuing a person
- Removing victim to safe location / place of safety

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

In accordance with the National Refresher Training Recognition Protocol for the Electricity Supply Industry, this unit is identified as a Refresher Training unit and is only available for use by industry to meet industry protocols and regulatory requirements.

Industry has defined Refresher Training as:

“A competency confirmation event which may include training, the purpose of which is to compensate for or prevent deterioration in a previously achieved standard of performance”

Under the protocol and the applicable State or Territory legislative and regulatory requirements, Electricity Supply Industry employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Industry accepts that opportunities to practice emergency procedures are generally restricted to simulated exercises in a controlled environment during competency confirmation programs.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments.

An industry endorsed Learning Assessment Plan (LAP) has been developed to support this unit.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated at each competency confirmation event.

- In accordance with State and Territory regulations and the “Assessment Guidelines – UET12”. Evidence shall also comprise:
 - Performance demonstrated within the timeframes typically expected of the rescue procedure. In particular the assessment of this unit shall confirm that a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum	Item List

	number of items on which skill is to be demonstrated	
A	All, to the satisfaction of the assessor	Identification of operational instructions and confirmation of the function of emergency equipment to facilitate rescue from an incident in an EWP
B	All, to the satisfaction of the assessor	Accessing controls and lowering the EWP in accordance with mobile equipment instructions/workplace procedures.
C	All, to the satisfaction of the assessor	Removing the victim from the EWP to the ground in accordance with workplace procedures

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual performance of EWP rescue procedures in the workplace.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

**Method of
assessment****9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units****9.5)**

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to EWP rescue procedures in the workplace and will include the following:

Applying work procedures and instructions as they apply to risk control and personal safety measures.

Inspection and function of emergency equipment to facilitate a prompt response and rescue from a raised EWP.

Accessing emergency lowering device in accordance with mobile equipment instructions/workplace procedures.

Removing the victim from contact with or in vicinity of live apparatus where necessary in accordance with workplace procedures.

Operation of emergency lowering device in accordance with mobile equipment instructions/workplace procedures.

Lowering the basket to the ground, removing the victim from the basket and performing CPR if required, in accordance with workplace procedures.

Facilitating treatment by medical professionals when and where required

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Assessing risk
- Assessment
- Authorisation
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Refresher Training Unit.

UETDRRRF04B Perform tower rescue

Modification History

Release	Action		Details	Points
	Update	Pre-requisite	HLTAID001 Provide cardiopulmonary resuscitation	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the performance of rescue procedures from an Electricity Supply Industry tower in the work place. It specifies the mandatory requirements of rescue from an ESI tower and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for, health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Application of the Unit

Application of the Unit 2)

This competency standard unit shall only be selected as part of an endorsed skill set for the purposes of refresher training and/or regulatory and/or network requirements.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also

subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

ESI employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only

Prerequisite Unit(s)**4)**

after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
HLTAID001	Provide cardiopulmonary resuscitation

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading	3	Writing	3	Numeracy	3
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Employability Skills Information**Employability Skills****5)**

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to perform tower rescue	1.1 Instruction in hazards and risk control measures for specific work areas and work activities are identified and obtained. (This will include the risk assessment and control measures taken by the individual performing the rescue).
	1.2 Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures.
2 Carry out tower rescue	2.1 Workplace procedures and work instructions for controlling risk are followed.
	2.2 Workplace procedures for accessing the tower, removing the victim, where necessary, from contact with live apparatus and are followed.
	2.3 Workplace procedures for attaching the emergency lowering equipment and lowering the victim to the ground are followed.
	2.4 Workplace procedures for carrying out CPR if required at the site and treatment where necessary by medical professionals are followed.
	2.5 The worksite is secured and entry controlled until appropriate authorities inspect and release the site.
3 Complete the performance of the tower rescue procedure	3.1 Processes for reporting to accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired with regard to the performance of tower rescue procedure.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRF04B Tower Rescue

Evidence shall show an understanding of tower rescue to an extent indicated by the following aspects:

T1 Emergency procedures for the tower rescue of a victim encompassing:

- Inspection of rescue equipment
- Assessing hazards to rescuer, victim and others
- Isolation procedures where appropriate
- Knowledge of Safe Approach Distances (SAD's) appropriate to Tower Rescue
- Involvement of external emergency services

T2 Emergency procedures for the skills required for tower rescue of a victim encompassing:

- Placement of rescue equipment
- Controlling hazards to rescuer, victim and others
- Maintaining Safe Approach Distances (SAD's) appropriate to Tower Rescue
- Practical demonstration of rescuing a person
- Removing victim to safe location / place of safety

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

In accordance with the National Refresher Training Recognition Protocol for the Electricity Supply Industry, this unit is identified as a Refresher Training unit and is only available for use by industry to meet industry protocols and regulatory requirements.

Industry has defined Refresher Training as:

“A competency confirmation event which may include training, the purpose of which is to compensate for or prevent deterioration in a previously achieved standard of performance”

Under the protocol and the applicable State or Territory legislative and regulatory requirements, Electricity Supply Industry employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Industry accepts that opportunities to practice emergency procedures are generally restricted to simulated exercises in a controlled environment during competency confirmation programs.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments.

An industry endorsed Learning Assessment Plan (LAP) has been developed to support this unit.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated at each competency confirmation event.

- In accordance with State and Territory regulations and the “Assessment Guidelines – UET12”. Evidence shall also comprise:
 - A performance demonstrated within the timeframes typically expected of the rescue procedure. In particular the assessment of this unit shall confirm that a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum	Item List

	number of items on which skill is to be demonstrated	
A	All, to the satisfaction of the assessor	Inspection and placement of rescue equipment
B	All, to the satisfaction of the assessor	Perform tower rescue in accordance with workplace procedures

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual performance of tower rescue procedures in the workplace.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to performing tower rescue procedures in the workplace and will include the following:

Inspection and placement of rescue equipment to facilitate a prompt response and rescue from an incident at the workplace.

Applying work procedures and instructions as they apply to risk control and personal safety measures.

Accessing the tower and placing, securing and attaching the lowering device to the victim in accordance with workplace procedures.

Removing the victim from contact with any live conductors/apparatus where necessary in accordance with workplace procedures.

Lowering the victim to the ground and performing CPR if required in accordance with workplace procedures.

Facilitating treatment by medical professionals when and where required

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Assessing risk
- Assessment
- Authorisation
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Requirements

RANGE STATEMENT

- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Refresher Training Unit

UETDRRRF05B Perform rescue from switchyard structures at heights

Modification History

Release	Action		Details	Points
	Update	Pre-requisite	HLTAID001 Provide cardiopulmonary resuscitation	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the performance of rescue procedures from switchyard structures at heights in the work place. It specifies the mandatory requirements of rescue from switchyard structures and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Application of the Unit

Application of the Unit 2)

This competency standard unit shall be selected as part of an endorsed skill set for the purposes of refresher training and/or to meet regulatory and/or network requirements.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

ESI employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
HLTAID001	Provide cardiopulmonary resuscitation

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to perform rescue from switchyard structures at heights	1.1	Instruction in hazards and risk control measures for specific work areas and work activities are identified and obtained. (This will include the risk assessment and control measures taken by the individual performing the rescue).
		1.2	Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures.
2	Carry out rescue from switchyard structures at heights	2.1	Workplace procedures and work instructions for controlling risk are followed.
		2.2	Workplace procedures for accessing the switchyard structure, removing the victim where necessary, from contact with live apparatus are followed.
		2.3	Workplace procedures for attaching the emergency lowering equipment and lowering the victim to the ground are followed.
		2.4	Workplace procedures for carrying out CPR if required at the site and treatment where necessary by medical professionals are followed.
		2.5	The worksite is secured and entry controlled until appropriate authorities inspect and release the site.

ELEMENT	PERFORMANCE CRITERIA
3 Complete rescue procedures from switchyard structures at heights	3.1 Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of procedures required to perform rescue at heights from switchyard structures.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRF05B Rescue from switchyard structures at heights

Evidence shall show an understanding of rescue from switchyard structures at heights to an extent indicated by the following aspects:

T1 Emergency procedures for the rescue of a victim from switchyard structures at heights encompassing:

- Inspection of rescue equipment
- Assessing hazards to rescuer, victim and others
- Isolation procedures where appropriate
- Knowledge of Safe Approach Distances (SAD's) appropriate to rescue from switchyard structures at heights
- Involvement of external emergency services

T2 Emergency procedures for the skills required for the rescue of a victim from switchyard structures at heights encompassing:

- Placement of rescue equipment
- Controlling hazards to rescuer, victim and others
- Maintaining Safe Approach Distances (SAD's) appropriate to rescue from switchyard structures at heights
- Practical demonstration of rescuing a person
- Removing victim to safe location / place of safety

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

In accordance with the National Refresher Training Recognition Protocol for the Electricity Supply Industry, this unit is identified as a Refresher Training unit and is only available for use by industry to meet industry protocols and regulatory requirements.

Industry has defined Refresher Training as:

“A competency confirmation event which may include training, the purpose of which is to compensate for or prevent deterioration in a previously achieved standard of performance”

Under the protocol and the applicable State or Territory legislative and regulatory requirements, Electricity Supply Industry employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Industry accepts that opportunities to practice emergency procedures are generally restricted to simulated exercises in a controlled environment during competency confirmation programs.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments.

An industry endorsed Learning Assessment Plan (LAP) has been developed to support this unit.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated at each competency confirmation event.

- In accordance with State and Territory regulations and the “Assessment Guidelines – UET12”. Evidence shall also comprise:
 - A performance demonstrated within the timeframes typically expected of the rescue procedure. In particular the assessment of this units shall confirm that a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum	Item List

	number of items on which skill is to be demonstrated	
A	All, to the satisfaction of the assessor	Inspection and placement of emergency rescue equipment.
B	All, to the satisfaction of the assessor	Perform a rescue from switchyard structures in accordance with workplace procedures

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual performance of rescue procedures at heights from switchyard structures in the workplace.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This competency standard unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills

described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to performing rescue procedure at heights from switchyard structures in the workplace and will include the following:

Applying work procedures and instructions as they apply to risk control and personal safety measures.

Inspection and placement of rescue equipment to facilitate a prompt response and rescue from an incident from switchyard structures.

Accessing switchyard structures and placing, securing and attaching the lowering device to the victim in accordance with workplace procedures.

Removing the victim from contact with any live conductors/apparatus where necessary in accordance with workplace procedures.

Lowering the victim to the ground in accordance with workplace procedures.

Facilitating treatment by medical professionals when and where required

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Assessing risk
- Assessment
- Authorisation
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Requirements

RANGE STATEMENT

- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Refresher Training Unit

UETTDRRF06B Perform rescue from a live LV panel

Modification History

Release	Action		Details	Points
	Update	Pre-requisite	HLTAID001 Provide cardiopulmonary resuscitation	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the performance of rescue procedures from live Low Voltage (LV) apparatus, not including overhead lines and underground cables in the work place. It specifies the mandatory requirements of rescue from a live LV panel and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for, health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Application of the Unit

Application of the Unit 2)

This competency standard unit shall be selected as part of an endorsed skill set for the purposes of refresher training and/or to meet regulatory and/or network requirements.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

ESI employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Common Unit Group

Unit Code	Unit Title
HLTAID001	Provide cardiopulmonary resuscitation

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to perform rescue procedures from live LV panel	<p>1.1 Instruction in hazards and risk control measures for specific work functions and work areas are identified and obtained. (This will include the risk assessment and control measures taken by the individual performing the rescue).</p> <p>1.2 Electricity isolation point is identified and labelled where appropriate.</p> <p>1.3 Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures.</p>
2 Carry out rescue from live LV panel	<p>2.1 Workplace procedures and work instructions for controlling risk are followed.</p> <p>2.2 Workplace procedures for accessing and isolating the LV panel and removing the victim, where necessary, from contact with live apparatus are followed.</p> <p>2.3 Workplace procedures for applying CPR if required at the site and gaining access to treatment by a medical professional if necessary are followed.</p> <p>2.4 The worksite is secured and entry controlled until appropriate authorities inspect and release the site.</p>

ELEMENT	PERFORMANCE CRITERIA
3 Complete the LV panel rescue procedure	3.1 Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of performing rescue from LV panel procedures.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRF06B Rescue from a live LV panel

Evidence shall show an understanding of rescue from a live LV panel to an extent indicated by the following aspects:

T1 Emergency procedures for the rescue of a victim from a live LV panel encompassing:

- Inspection of rescue equipment
- Assessing hazards to rescuer, victim and others
- Isolation procedures where appropriate
- Knowledge of Safe Approach Distances (SAD's) appropriate to rescue from a live LV panel
- Involvement of external emergency services

T2 Emergency procedures for the skills required for the rescue of a victim from a live LV panel encompassing:

- Placement of rescue equipment
- Controlling hazards to rescuer, victim and others
- Maintaining Safe Approach Distances (SAD's) appropriate to rescue from a live LV panel
- Practical demonstration of rescuing a person
- Removing victim to safe location / place of safety

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

In accordance with the National Refresher Training Recognition Protocol for the Electricity Supply Industry, this unit is identified as a Refresher Training unit and is only available for use by industry to meet industry protocols and regulatory requirements.

Industry has defined Refresher Training as:

“A competency confirmation event which may include training, the purpose of which is to compensate for or prevent deterioration in a previously achieved standard of performance”

Under the protocol and the applicable State or Territory legislative and regulatory requirements, Electricity Supply Industry employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Industry accepts that opportunities to practice emergency procedures are generally restricted to simulated exercises in a controlled environment during competency confirmation programs.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments.

An industry endorsed Learning Assessment Plan (LAP) has been developed to support this unit.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated at each competency confirmation event.

- In accordance with State and Territory regulations and the “Assessment Guidelines – UET12”. Evidence shall also comprise:
 - A performance demonstrated within the timeframes typically expected of the rescue procedure. In particular the assessment of this unit shall confirm that a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum	Item List

	number of items on which skill is to be demonstrated	
A	All, to the satisfaction of the assessor	Inspection and placement of rescue equipment
B	All, to the satisfaction of the assessor	Identification and labelling of the isolation point
C	All, to the satisfaction of the assessor	Perform a rescue from a LV panel in accordance with workplace procedures

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake performance of LV panel rescue procedures in the workplace.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in a realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is

primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to performing rescue procedures from live LV panel in the workplace and will include the following:

Applying work procedures and instructions as they apply to risk control and personal safety measures.

Inspection and placement of rescue equipment to facilitate a prompt response and rescue of a victim from a live LV panel.

Identification and labelling of the isolation point in accordance with workplace procedures

Isolating the electricity supply where possible by utilizing the appropriate apparatus

Removing the victim from contact with any live conductors/apparatus where necessary in accordance with workplace procedures.

Facilitating treatment by medical professionals when and where required

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Refresher Training Unit.

UETTDRRF07B Perform cable pit/trench/excavation rescue

Modification History

Release	Action		Details	Points
	Update	Pre-requisite	HLTAID001 Provide cardiopulmonary resuscitation	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the performance of cable pit/trench/excavation rescue procedures as they apply to live LV cable jointing in the work place. It specifies the mandatory requirements of rescue from a cable pit/trench/excavation and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Application of the Unit

Application of the Unit 2)

This competency standard unit shall be selected as part of an endorsed skill set for the purposes of refresher training and/or to meet regulatory and/or network requirements.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

ESI employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
HLTAID001	Provide cardiopulmonary resuscitation

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading	3	Writing	3	Numeracy	3
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Employability Skills Information

Employability Skills 5)

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to perform cable pit/trench/excavation rescue	1.1	Instruction in hazards and risk control measures for specific work functions and work areas are identified and obtained. (This will include the risk assessment and control measures taken by the individual performing the rescue).
		1.2	Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures.
2	Carry out cable pit/trench/excavation rescue	2.1	Workplace procedures and work instructions for controlling risk are followed.
		2.2	Workplace procedures for accessing the cable pit/trench/excavation, removing the victim, where necessary, from contact with live apparatus are followed.
		2.3	Workplace procedures for removing the victim, where necessary, from the cable pit/trench/excavation, are followed.
		2.4	Workplace procedures for carrying out CPR if required at the site and treatment where necessary by medical professionals are followed.
		2.5	The worksite is secured and entry controlled until appropriate authorities release the site.
3	Complete the cable pit/trench/excavation rescue procedures	3.1	Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of cable pit/trench/excavation rescue procedures.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRF07B Cable pit/trench/excavation rescue

Evidence shall show an understanding of cable pit/trench/excavation rescue to an extent indicated by the following aspects:

T1 Emergency procedures for the rescue of a victim from a cable pit/trench/excavation encompassing:

- Inspection of rescue equipment
- Assessing hazards to rescuer, victim and others
- Isolation procedures where appropriate
- Knowledge of Safe Approach Distances (SAD's) appropriate to cable pit/trench/excavation rescue
- Involvement of external emergency services

T2 Emergency procedures for the skills required for the rescue of a victim from a cable pit/trench/excavation encompassing:

- Placement of rescue equipment
- Controlling hazards to rescuer, victim and others
- Maintaining Safe Approach Distances (SAD's) appropriate to cable pit/trench/excavation rescue
- Practical demonstration of rescuing a person
- Removing victim to safe location / place of safety

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

In accordance with the National Refresher Training Recognition Protocol for the Electricity Supply Industry, this unit is identified as a Refresher Training unit and is only available for use by industry to meet industry protocols and regulatory requirements.

Industry has defined Refresher Training as:

“A competency confirmation event which may include training, the purpose of which is to compensate for or prevent deterioration in a previously achieved standard of performance”

Under the protocol and the applicable State or Territory legislative and regulatory requirements, Electricity Supply Industry employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Industry accepts that opportunities to practice emergency procedures are generally restricted to simulated exercises in a controlled environment during competency confirmation programs.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments.

An industry endorsed Learning Assessment Plan (LAP) has been developed to support this unit.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated at each competency confirmation event.

- In accordance with State and Territory regulations and the “Assessment Guidelines – UET12”. Evidence shall also comprise:
 - A performance demonstrated within the timeframes typically expected of the rescue procedure. In particular the assessment of this unit shall confirm that a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum	Item List

	number of items on which skill is to be demonstrated	
A	All, to the satisfaction of the assessor	Inspection and placement of rescue equipment for a cable pit/trench/excavation rescue
B	All, to the satisfaction of the assessor	Perform a rescue from a pit/trench/excavation in accordance with workplace procedures

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake performance of cable pit/trench/excavation rescue procedures in the workplace.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in a realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and

demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to performing cable pit/trench/excavation rescue procedures in the workplace and will include the following:

Applying work procedures and instructions as they apply to risk control and personal safety measures.

Inspection and placement of rescue equipment to facilitate a prompt response and rescue from a cable pit/trench/excavation.

Accessing the cable pit/trench/excavation in accordance with workplace procedures.

Removing the victim from contact with any live conductors/apparatus where necessary in accordance with workplace procedures.

Removing the victim from the cable pit/trench/excavation in accordance with workplace procedures.

Facilitating treatment by medical professionals when and where required

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Refresher Training Unit.

UETTDRRF08B Perform EWP controlled descent escape

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the performance of Elevating Work Platform (EWP) controlled descent escape procedures in the work place. It specifies the mandatory requirements for self rescue from a raised EWP and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for, health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Application of the Unit

Application of the Unit 2)

This competency standard unit shall be selected as part of an endorsed skill set for the purposes of refresher training and/or to meet regulatory and/or network requirements.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of

plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

ESI employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Prerequisite Unit(s) 4)

There are no prerequisite competencies to this unit.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1 Prepare to perform EWP controlled descent escape	1.1 Instruction in hazards and risk control measures for specific work areas and work activities are identified and obtained.
	1.2 Tools and emergency descent equipment is checked for safety and function to ensure accessibility according to established procedures.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out EWP controlled descent escape	2.1 Workplace procedures and work instructions for controlling risk are followed.
	2.2 Workplace procedures for evacuating a EWP basket employing emergency descent equipment are followed.
	2.3 The worksite is secured and entry controlled until appropriate authorities inspect and release the site.
3 Complete the EWP controlled descent escape procedure	3.1 Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of EWP controlled descent escape procedures.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRF08B EWP Controlled descent escape

Evidence shall show an understanding of EWP controlled descent escape to an extent indicated by the following aspects:

T1 Procedures for EWP controlled descent escape encompassing:

- Inspection of rescue equipment
- Assessing hazards to self and others
- Involvement of external emergency services as appropriate
- Knowledge of Safe Approach Distances (SAD's) appropriate to EWP controlled descent escape

T2 Skills required for EWP controlled descent escape encompassing:

- Fitting of rescue equipment
- Controlling hazards to self and others
- Maintaining Safe Approach Distances (SAD's) for an EWP controlled descent escape
- Practical demonstration of rescuing self
- Removing self to safe location / place of safety

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

In accordance with the National Refresher Training Recognition Protocol for the Electricity Supply Industry, this unit is identified as a Refresher Training unit and is only available for use by industry to meet industry protocols and regulatory requirements.

Industry has defined Refresher Training as:

“A competency confirmation event which may include training, the purpose of which is to compensate for or prevent deterioration in a previously achieved standard of performance”

Under the protocol and the applicable State or Territory legislative and regulatory requirements, Electricity Supply Industry employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Industry accepts that opportunities to practice emergency procedures are generally restricted to simulated exercises in a controlled environment during competency confirmation programs.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments.

An industry endorsed Learning Assessment Plan (LAP) has been developed to support this unit.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated at each competency confirmation event.

- In accordance with State and Territory regulations and the “Assessment Guidelines – UET12”. Evidence shall also comprise:
 - A performance demonstrated within the timeframes typically expected of the rescue procedure. In particular the assessment of this unit shall confirm that a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum	Item List

	number of items on which skill is to be demonstrated	
A	All, to the satisfaction of the assessor	Accessing, inspecting, securing and attaching emergency descent equipment to self in accordance with workplace procedures
B	All, to the satisfaction of the assessor	Evacuating the EWP and descending to the ground in accordance with workplace procedures

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual performance of EWP controlled descent escape procedures in the workplace.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in a realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is

primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to performing EWP controlled descent escape procedures in the workplace and will include the following:

Inspection of rescue equipment to facilitate a controlled descent from a EWP.

Applying work procedures and instructions as they apply to risk control and personal safety measures.

Accessing, securing and attaching the lowering device to self in accordance with workplace procedures.

Lowering self to the ground from the raised EWP.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Assessing risk
- Assessment
- Authorisation
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Refresher Training Unit

UETTDRRF09B Apply access procedures to work on or near electrical network infrastructure

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the performance of the procedures to gain access for work on or near electrical network infrastructure in the context of transmission, distribution or rail work functions. It encompasses responsibilities for, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Application of the Unit

Application of the Unit 2)

This competency standard unit shall be selected as part of an endorsed skill set for the purposes of refresher training and/or to meet regulatory and/or network requirements.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of

plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

ESI employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Prerequisite Unit(s) 4)

There are no prerequisite competencies to this unit.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|--|---|
| 1 Prepare to apply access authority procedures for work on or near electrical network infrastructure | 1.1 Rules/Codes of Practice for work on or near electrical hazards and risk control measures for specific work areas and work activities are identified and obtained. |
| | 1.2 Procedures for access authority/work permits including roles and responsibilities are obtained, learnt, understood and tested according to |

ELEMENT	PERFORMANCE CRITERIA
	established procedures.
	1.3 Access authority/work permit document is identified, obtained, learnt, and understood for a specific work activity according to established procedures.
2 Carry out access authority procedures for work on or near electrical network infrastructure	2.1 Workplace procedures for confirming personal are appropriately qualified, fit for purpose and sign on to an Access Authority/Work Permit document is followed according to established procedures.
	2.2 Safe Approach Distances and Safety Measures applicable to the work activity are identified and confirmed according to established procedures
	2.3 Workplace procedures for signing on to an Access Authority/Work Permit are followed.
	2.4 Workplace procedures for individual sign on to a specific role/function identified for the work is followed according to established procedures
	2.5 Workplace procedures confirming issue and commencement of work under an Access Authority/Work Permit document are communicated according to established procedures.
3 Complete access authority procedures for work on or near electrical network infrastructure	3.1 Workplace procedures confirming work completion or suspension is communicated in accordance with established procedures.
	3.2 Workplace procedures to ensure all personnel signed on to an Access Authority/Work Permit document; sign off in accordance with established procedures.
	3.3 Workplace procedures to cancel or suspend an Access Authority/Work Permit document is performed in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of applying access procedures to work on or near electrical network infrastructure

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRF09B Access procedures to work on or near electrical network infrastructure

Evidence shall show an understanding of access procedures to work on or near electrical network infrastructure to an extent indicated by the following aspects:

T1 Working on or near electrical network infrastructure encompassing:

- Rules/Codes of Practice for work on or near electrical hazards and risk control measures for specific work areas and work activities
- Documentation, roles, responsibilities and procedures for a permit to work system
- Access Authority/Work Permit document for a specific work activity according to established procedures
- Safe Approach Distances (SAD's) and Safety Measures applicable to the work activity according to established procedures
- Sign on and sign off procedures for an Access Authority/Work Permit document
- Workplace procedures to cancel or suspend an Access Authority/Work Permit document
- Workplace communication procedures to confirm work is completed or suspended
- Workplace procedures for signing onto a specific role/function identified on an Access Authority/Work Permit

T2 Skills required to work on or near electrical network infrastructure encompassing:

- Sign on and sign off an Access Authority/Work Permit document in accordance with workplace procedures

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

In accordance with the National Refresher Training Recognition Protocol for the Electricity Supply Industry, this unit is identified as a Refresher Training unit and is only available for use by industry to meet industry protocols and regulatory requirements.

Industry has defined Refresher Training as:

“A competency confirmation event which may include training, the purpose of which is to compensate for or prevent deterioration in a previously achieved standard of performance”

Under the protocol and the applicable State or Territory legislative and regulatory requirements, Electricity Supply Industry employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Industry accepts that opportunities to practice emergency procedures are generally restricted to simulated exercises in a controlled environment during competency confirmation programs.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments.

An industry endorsed Learning Assessment Plan (LAP) has been developed to support this unit.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated at each competency confirmation event.

- In accordance with State and Territory regulations and the “Assessment Guidelines – UET12”. Evidence shall also comprise:
 - a. A performance demonstrated within the timeframes typically expected of the rescue procedure. In particular the assessment of this unit shall confirm that a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum	Item List

	number of items on which skill is to be demonstrated	
A	All, to the satisfaction of the assessor	Workplace procedures for signing on to and off from an Access Authority/Work Permit

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake network access/work permit procedures in the workplace.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in a realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit is may be assessed concurrently with

UETTDRRF0 1B Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to performing access authority procedures for work on or near electrical network infrastructure in the workplace and will include the following:

Identification, learning and application of Rules/Codes of Practice as they apply to Access Authority/Work Permit systems for work on or near electrical network infrastructure.

Understanding safe approach distances and safety measures applicable to work on or near electrical network infrastructure

Applying work procedures and instructions as they apply to risk control and personal safety measures.

Understanding the roles and responsibilities applicable to the operation of an Access Authority/Work Permit System for work on or near electrical network infrastructure.

Identifying and completing an Access Authority/Work Permit document for a designated role.

Understanding the processes and systems applicable to issue, suspension and cancellation of an Access Authority/Work Permit document.

Participation in consultation processes, identifying hazards and implementing and monitoring control measures at the work site.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Assessing risk
- Assessment
- Authorisation
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Refresher Training Unit

UETTDRRF10B Provide first aid in an ESI environment

Modification History

Release	Action		Details	Points
	Update	Pre-requisite	HLTAID001 Provide cardiopulmonary resuscitation	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the provision of first aid in an Electricity Supply Industry (ESI) environment. It includes the recognition and provision of an initial response where first aid is required in emergency situations by providing essential first aid using basic life support measures according to established workplace first aid policies and procedures.

Application of the Unit

Application of the Unit 2)

This competency standard unit shall be selected as part of an endorsed skill set for the purposes of refresher training and/or to meet regulatory and/or network requirements.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of

training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

ESI employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Prerequisite Unit(s) 4)

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
HLTAID001	Provide cardiopulmonary resuscitation

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading	3	Writing	3	Numeracy	3
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Employability Skills Information**Employability Skills 5)**

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to provide first aid in an ESI environment	1.1 Identify physical hazards and risks to personal and others' health and safety according to established procedures.
	1.2 Assess the situation and decide on actions required.
	1.3 Seek assistance from others, if required.
2 Carry out the provision of first aid in an ESI environment	2.1 Assess the victim's physical condition and visible vital signs.
	2.2 Provide first aid to stabilise the victim's condition in accordance with recognised first aid procedures.
	2.3 Use available first aid equipment as appropriate.
	2.4 Notify emergency services appropriate to the situation.
	2.5 Convey information about the victim's condition accurately and clearly to emergency services personnel or health professionals.
3 Complete provision of first aid in an ESI environment	3.1 Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of the provision of first aid in an ESI environment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRF10B First Aid in an ESI environment

Evidence shall show an understanding of First Aid in an ESI environment to an extent indicated by the following aspects:

T1 Provision of First Aid in an emergency situation encompassing:

- Assessing hazards to rescuer, victim and others
- Involvement of external emergency services
- Knowledge of the treatment of electrical burns, shock, bites, stings, bleeding and electric shock

T2 Skills required to provide First Aid in an emergency situation encompassing:

- Controlling hazards to rescuer, victim and others
- Use of available first aid equipment and resources
- Injury management using first aid principles

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

In accordance with the National Refresher Training Recognition Protocol for the Electricity Supply Industry, this unit is identified as a Refresher Training unit and is only available for use by

industry to meet industry protocols and regulatory requirements.

Industry has defined Refresher Training as:

“A competency confirmation event which may include training, the purpose of which is to compensate for or prevent deterioration in a previously achieved standard of performance”

Under the protocol and the applicable State or Territory legislative and regulatory requirements, Electricity Supply Industry employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Industry accepts that opportunities to practice emergency procedures are generally restricted to simulated exercises in a controlled environment during competency confirmation programs.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments.

An industry endorsed Learning Assessment Plan (LAP) has been developed to support this unit.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated at each competency confirmation event.

In accordance with State and Territory regulations and the

“Assessment Guidelines – UET12”. Evidence shall also comprise:

- A performance demonstrated within the timeframes typically expected of the rescue procedure. In particular the assessment of this unit shall confirm that a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All, to the satisfaction of the assessor	Check site for danger to self, victim and others minimising the danger
B	At least two of the following to the satisfaction of the assessor	Management of: *Electrical burns Bites or stings Shock Bleeding Electrical Shock *Must do

C	All, to the satisfaction of the assessor	Monitor and Manage Victim Raising alarm with emergency services.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual performance of the provision of first aid, in an ESI environment, in the workplace.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in a realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with HLTAID001 Provide cardiopulmonary resuscitation

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the provision of first aid in an ESI environment and may include the following:

Established first aid principles include checking the site for danger to self, victim and others and minimising the danger.

First aid management will need to take into consideration the use and availability of first aid equipment and resources.

Injury management may include; Electrical shock, Burns including thermal, chemical and friction, Bites or stings and bleeding.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
 Refresher Training Unit

UETDRRF11A Testing of connections to low voltage electricity networks

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the performance of testing of connections to low voltage electricity networks according to the relevant AS 4741. It specifies the mandatory requirements for testing when connecting and/or reconnecting a customer's installation to an electricity supply network

It encompasses the minimum principles and tests required to confirm that the low voltage supply connections are correct

Application of the Unit

Application of the Unit 2)

This competency standard unit shall be selected as part of an endorsed skill set for the purposes of refresher training and/or to meet regulatory and/or network requirements.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

ESI workers approved by the network operator to test and connect and/or reconnect customers installations to an electricity supply network are required to maintain competency in this unit

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All

Prerequisite Unit(s) 4)

competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

There are no prerequisite competencies to this unit.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to perform test procedures	1.1 Instruction in hazards and risk control measures for specific work functions and work areas are identified and obtained. (this will include the risk assessment and control measures taken by the individual performing the tests)
	1.2 Tools and equipment needed for testing are checked for inspection date, safety, and functionality.
2 Carry out test procedures	2.1 Workplace procedures and work instructions for controlling risk are followed.
	2.2 Conduct test procedures in accordance with AS 4741.
	2.3 Enterprise procedures for corrective actions are followed.
	2.4 Document test results in accordance with established enterprise procedures.
3 Complete the test procedures	3.1 Processes for reporting to authorised personnel are confirmed in accordance with established procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of AS 4741

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRF11A Low voltage electricity networks connections testing

Evidence shall show an understanding of low voltage electricity networks connections testing to an extent indicated by the following aspects:

T1 Low voltage testing of network connections encompassing:

- Selection and inspection of test equipment relevant for the testing procedures
- Acceptable neutral voltage criteria
- Polarity testing
- Neutral integrity testing
- Phase rotation testing
- Phasing confirmation
- Corrective actions to network operator's procedures
- Recording and reporting results to network operator's procedures

T2 Skills required to test low voltage network connection encompassing:

- Preparation and use of test equipment
- Preparation and correct use of PPE
- Testing of single phase and multi phase connections to network operator's procedures
- Documenting test results to network operator's procedures

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

In accordance with the National Refresher Training Recognition Protocol for the Electricity Supply Industry, this unit is identified as a Refresher Training unit and is only available for use by industry to meet industry protocols and regulatory requirements.

Industry has defined Refresher Training as:

“A competency confirmation event which may include training, the purpose of which is to compensate for or prevent deterioration in a previously achieved standard of performance”

Under the protocol and the applicable State or Territory legislative and regulatory requirements, Electricity Supply Industry employees are required to maintain currency in this Unit for authorisation/approval to work on ESI Networks.

Industry accepts that opportunities to practice emergency procedures are generally restricted to simulated exercises in a controlled environment during competency confirmation programs.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated at each competency confirmation event.

- In accordance with State and Territory regulations and the “Assessment Guidelines – UET09”. Evidence shall also comprise:
 - A performance demonstrated within the timeframes typically expected of the procedure. In particular the assessment of this unit shall confirm that a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Perform, to the	Preparation and use of

	satisfaction of the assessor	test equipment
B	Perform, to the satisfaction of the assessor	Preparation and correct use of PPE
C	Perform, to the satisfaction of the assessor	Testing of single phase and multi phase connections to network operator's procedures
D	Perform, to the satisfaction of the assessor	Document test results to network operator's procedures

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to organisational testing procedures, information and resources typical of the workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake connection and test procedures in the workplace.

In addition to the resources listed above, in context of any specific resources for assessment, evidence should show demonstrated competency working in a realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is

expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills and their application are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competence in this unit is not recommended to be assessed concurrently with any other unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to performing test procedures described in AS 4741.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons
- Appropriate authorities
- Assessing risk
- Assessment
- Authorisation
- Emergency
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Personnel
- Requirements
- Calibration of test equipment

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Entry Level – Refresher Training Units.

UETDRRT21A Install traction overhead wiring systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation of overhead traction wiring systems to ensure proper installation, in particular the correct registration of the contact wire with respect to the current collectors. It includes the undertaking of safe working practices on or about the running line/track and the preparation needed for stringing and profiling including the isolation of systems and circuits for safe working according to work plans. It may also encompass the correct positioning of road signs, barriers and or warning devices, and the procedure of issuing/accepting electrical permits. It also includes the visual and other necessary checks to confirm that equipment and associated hardware have been correctly installed according to design and are in a safe condition to undertake pre-commissioning tests prior to, putting into service, and updating of, installation data such as as-built drawings and relevant quality assurance documentation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

- | | |
|-------------|--|
| UEENEEE101A | Apply Occupational Health and Safety regulations, codes and practices in the workplace |
| UEENEEE102A | Fabricate, assemble and dismantle utilities industry components |
| UEENEEE104A | Solve problems in d.c. Circuits |
| UEENEEE105A | Fix and secure electrotechnology equipment |
| UEENEEE107A | Use drawings, diagrams, schedules, standards, codes and specifications |

Prerequisite Unit(s)	4)
	UEENEEG101A Solve problems in electromagnetic devices and related circuits
	UEENEEG102A Solve problems in low voltage a.c. Circuits
	UETTDREL11A Apply sustainable energy and environmental procedures
	UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A Working safely near live electrical apparatus
	UETTDNIS52A Install and maintain poles, structures and associated hardware
	UETTDNIS54A Install and maintain poles, structures, overhead conductors and cables

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to install overhead traction wiring systems	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the installation of overhead traction wiring systems are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p> <p>1.8 Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue</p>

ELEMENT	PERFORMANCE CRITERIA
	procedures and related work procedures according to requirements.
	1.9 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.12 Rail/Road signs, barriers and warning devices are positioned in accordance with requirements
	1.13 Environmental constraints applicable to work are identified and control measures applied.
2 Carry out the installation of overhead traction wiring systems	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.
	2.4 Essential knowledge and associated skills are applied in the safe installation of overhead traction wiring systems to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.

ELEMENT	PERFORMANCE CRITERIA
	<p>2.5 Overhead traction wiring systems, including cables, fittings, traction conductors and associated equipment are installed according to design and work schedule requirements and established procedures.</p> <p>2.6 Profiling completed according to established procedures.</p> <p>2.7 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.8 Unplanned events in the installation of overhead traction wiring systems are undertaken within the scope of established procedures.</p> <p>2.9 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.</p> <p>2.10 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.</p>
3 Complete the installation of overhead traction wiring systems	<p>3.1 Work undertaken is checked against design drawings and works schedule for conformance with requirements and anomalies reported in accordance with established procedures.</p> <p>3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.</p> <p>3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.</p> <p>3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.5 Relevant work permit(s) are signed off and, the overhead traction wiring system is returned to service in accordance with requirements.</p>

ELEMENT**PERFORMANCE CRITERIA**

- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of installing overhead traction wiring systems has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS02-TRT21A Electrical overhead traction wiring systems

Evidence shall show an understanding of electrical traction systems to an extent indicated by the following aspects:

T1 Electrical wiring system components - earth wires, feeder wire, return conductor, insulators, catenary wire, contact/trolley wire, droppers, tensioning equipment, current collectors, tram support networks, tram fittings, bridge/tunnel fittings

T2 Electrical traction circuits encompassing:

- Types
- Applications

T3 Relationship of the components, apparatus and the conductors to the operation of the traction system

T4 Effective current collection and wire interface

T5 Effective registration in the traction power system

T6 Profiling overhead traction wire methods encompassing:

- Factors that impact on current collectors
- Methods to achieving smooth current collector transitions and interfaces
- **T7** Dynamic and static forces encompassing:
- Types that effect traction systems
- Effects on effective registration
- Techniques to minimise the adverse effects

KS03-TRT21A Electrical traction principles

Evidence shall show an understanding of electrical traction principles to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to the electrical traction

T2 Electrical traction voltage and current circuit paths encompassing:

- Transmission distribution voltages
- Traction supply system and voltages
- Return and stay current paths, including electrolysis

REQUIRED SKILLS AND KNOWLEDGE

T3 Relationship of sectioning, section insulator and overlaps/air gaps in a traction power system

T4 Traction power system components encompassing:

- Function of transformer/rectifiers
- Configuration and purpose of traction overhead wiring systems
- Function of isolators/switches
- Function of the circuit breaker

T5 Reliability and security of traction supply

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being

assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated

- environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least four of the following:	Support structure, Span, Section insulator, Neutral section, Midpoint anchor, Support equipment, Tension regulators, Stay/guy wire, Tramway support network
B	At least two of the following:	Catenary, Dropper, Contact/trolley*, Feeder, Earth conductor, Drape/potential jumper (*must do)
C	At least one of the following:	Elevating work platform, Ladder, Mobile platform

D	At least two of the following:	Tensioning equipment*, Specialised tools, Ropes, Geometry profiling equipment. (*must do)
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation of overhead traction wiring systems.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRRT2 Install overhead traction components and
7A equipment

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Unit shall be demonstrated in relation to the installation of overhead traction wiring systems as it relates to the correct registration of the contact wire with respect to the current collectors

Types of conductor may include HD, CAD, tin bearing and magnesium copper, aluminium, steel, aluminium conductor steel reinforced (ACSR), insulated screened and unscreened cable and pilot and control cables.

Materials and equipment may include porcelain, glass, ceramic, fibre glass and composite insulators, steel, brass, stainless steel, neoprene, copper, cast and galvanized fittings, drums, pulleys, hooks, yoke plate, line grips, tensioning devices, ropes, slings, hydraulic/manual crimping and cutting tools, specialized tools and dynamometers; Conductors and support wires include droppers wire, catenary wire, contact/trolley wire, earth wire, feeder wire, drape/potential jumper wire, stay wire, cross-span, networks and head span wire.

Associated equipment to conductors may include registration arms, midpoint anchors, section insulators, neutral sections, supports, cantilevers, portals, drop verticals, surge diverters and tensioning devices.

Plant may include ladders, elevating work platform, winches and capstans, specialist tensioning stringing equipment, cable trailers and drum stands, rail and road rail mounted overhead wiring vehicles.

Installing tension regulators encompasses fitting, positioning and securing weight chains and pulley systems.

Permits may include access permits, permits to work and or other relevant permits and documents by recognised bodies.

Profiling encompasses sag, tension, encumbrances, offsets, cants and registration which involves horizontal and vertical calibration of the contact wire or trolley wire to a design height and stagger in reference to the running rail.

Current collectors may include pantographs and tram trolley poles.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment

RANGE STATEMENT

- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Rail Traction Units

UETDRRT22A Maintain traction overhead wiring systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance and repair of overhead traction wiring systems to ensure their serviceability, in particular the correct registration of the contact wire with respect to the current collectors. It includes the undertaking of safe working practises on or about the running line/track, the preparation needed for stringing and profiling including the isolation of systems and circuits for safe working according to work plans, the diagnosis of faults and the modification and re-adjustment to appropriate standards. It may also encompass the correct positioning of road signs, barriers and or warning devices and the procedure of issuing/accepting electrical permits, the re-commissioning tests as required to ensure the integrity of the traction system prior to returning to service and, the updating of system data and/or maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules,

Prerequisite Unit(s)	4)	standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI52A	Install and maintain poles, structures and associated hardware
	UETTDRI54A	Install and maintain poles, structures, overhead conductors and cables
	UETDRRT21A	Install traction overhead wiring systems

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged

Employability Skills

5)

will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Prepare to maintain overhead traction wiring systems	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.3	OHS policies and procedures related to requirements and established procedures for the maintenance of overhead traction wiring systems are obtained and confirmed for the purposes of the work to be performed and communicated.
		1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
		1.5	Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
		1.6	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.

ELEMENT	PERFORMANCE CRITERIA
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
	1.8 Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue procedures according to requirements.
	1.9 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.12 Rail/road signs, barriers and warning devices are positioned in accordance with requirements.
	1.13 Environmental constraints applicable to work are identified and control measures applied.
2 Carry out maintenance on overhead traction wiring systems	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.
	2.4 Essential knowledge and associated skills are

ELEMENT**PERFORMANCE CRITERIA**

- applied for the safe maintenance of overhead traction wiring systems to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.5 Maintenance, including repair and/or replacement of overhead traction wiring systems, including the modification and re-adjustment of overhead traction conductors is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.6 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.7 Unplanned events in the maintenance on overhead traction wiring systems are undertaken within the scope of established procedures.
- 2.8 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.9 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 2.10 Recommissioning checks and tests are undertaken to ensure the integrity of the system prior to returning to service.
- 3 Complete the maintenance on overhead traction wiring systems
- 3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures
- 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned,

ELEMENT**PERFORMANCE CRITERIA**

- checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, the overhead traction wiring system is returned to service in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of maintaining overhead traction wiring systems has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT22A Maintain overhead traction wiring systems

Evidence shall show an understanding of the maintenance of overhead wiring systems indicated by the following aspects:

T1 Electrical wiring system components

- (Note: Examples include catenary wire, contact/trolley wire, droppers, feeder wire, return conductor, insulators, surge arresters, cantilevers, tensioning equipment, tram support network, tram fittings, bridge/tunnel fittings, current collectors)

T2 Electrical traction circuits encompassing:

- Types
- Applications

T3 Relationship of the components, apparatus and conductors to the operation of the traction system

T4 Effective current collection and wire interface

T5 Effective registration in the traction power system

T6 Dynamic and static forces encompassing:

- Types that effect traction systems
- Effects on effective registration
- Techniques to minimise adverse effects

T7 Safe and effective use of repair and maintenance tools, equipment and machinery

T8 Maintenance of overhead traction wiring systems encompassing:

- Types of equipment and components
- Types and function of tools and equipment
- Maintenance/repair procedures
- Inspection and recording procedures

T9 Diagnose and correct simple faults in specific overhead wiring systems encompassing:

- Types and causes
- Determination of appropriate corrective actions

REQUIRED SKILLS AND KNOWLEDGE

- Repair and replace procedures for overhead wiring systems

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to

safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least four of the following:	Support structure Span Section insulator Neutral section Midpoint anchor Support equipment Tension regulators Stay/guy wire Tramway support network
B	At least two of the following:	Catenary Dropper Contact/trolley* Feeder Earth conductor Drape/potential jumper (* must do)
C	At least one of the following:	Elevating work platform Ladder Mobile platform
D	At least two of the following:	Tensioning equipment* Specialised tools Ropes Geometry profiling equipment (* must do)

E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of overhead traction wiring systems.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRRT2 8A Maintain overhead traction components and equipment

UETDRRT2 9A Operate rail road traction height access equipment.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of overhead traction wiring systems as it relates to the correct registration of the contact wire with respect to the current collectors

Maintenance may include the removal, repair and replacement of cables, conductors and associated hardware.

Types of conductor may include HD, CAD, tin bearing and magnesium copper, aluminium, steel, aluminium conductor steel reinforced (ACSR), insulated screened and unscreened cable and pilot and control cables.

Materials and equipment may include porcelain, glass, ceramic, fibre glass and composite insulators, steel, brass, stainless steel, neoprene, copper, cast and galvanized fittings, drums, pulleys, hooks, yoke plate, line grips, tensioning devices, ropes, slings, hydraulic/manual crimping and cutting tools, specialized tools and dynamometers.

Conductors and support wires include droppers wire, catenary wire, contact/trolley wire, earth wire, feeder wire, drape/potential jumper wire, stay wire, cross-span, networks and head span wire.

Associated equipment to conductors may include registration arms, midpoint anchors, section insulators, neutral sections, supports, cantilevers, portals, drop verticals, surge diverters and tensioning devices.

Plant may include ladders, elevating work platform, winches and capstans, specialist tensioning stringing equipment, cable trailers and drum stands, rail and road rail mounted overhead wiring vehicles.

Installing tension regulators encompasses fitting, positioning and securing weight chains and pulley systems.

Permits may include access permits, permits to work and or other relevant permits and documents by recognised bodies.

Profiling encompasses sag, tension, encumbrances, offsets, cants and registration which involves horizontal and vertical calibration of the contact wire or trolley wire to a design height and stagger in reference to the running rail.

Current collectors may include pantographs and tram trolley poles.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities

RANGE STATEMENT

- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Rail Traction Units

UETDRRT23A Install rail traction bonds

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation of the temporary and permanent traction bonds and bonding cables. It includes the undertaking of safe working practices on or about the running line/track. It may also encompass the isolation of systems and circuits for safe working according to work plans and the correct positioning of road signs, barriers and or warning devices and the procedure of issuing/accepting electrical permits and includes the necessary checks to confirm that bonds, bonding cables and associated hardware have been correctly installed according to design and are in a safe condition to test prior to putting into service. It also includes the undertaking of pre-commissioning tests and the updating of installation data and relevant quality assurance documentation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules,

Prerequisite Unit(s)	4)	standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI52A	Install and maintain poles, structures and associated hardware
	UETTDRI54A	Install and maintain poles, structures, overhead conductors and cables

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to install traction bonds	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the installation of traction bonds are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working</p>

ELEMENT	PERFORMANCE CRITERIA
	order.
	1.8 Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue procedures according to requirements.
	1.9 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.12 Rail/road signs, barriers and warning devices are positioned in accordance with requirements.
	1.13 Environmental constraints applicable to work.
2 Carry out installation of traction bonds	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.</p> <p>2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.</p> <p>2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.</p> <p>2.4 Essential knowledge and associated skills are applied in the safe installation of traction bonds and bonding cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p>

ELEMENT	PERFORMANCE CRITERIA
	2.5 Cable and surrounds, including rail and other surfaces, are prepared to enable joint and terminations to be carried out according to established procedures.
	2.6 Traction bonds are carried out according to requirements and established procedures.
	2.7 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.8 Unplanned events during the installation of traction bonds are undertaken within the scope of established procedures.
	2.9 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.10 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the installation of traction bonds	3.1 Work undertaken is checked and tested against design drawings and works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.4 Relevant work permit(s) are signed off and, the system that has undergone the installation of a traction bond(s) is returned to service in accordance with requirements.
	3.5 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and

ELEMENT**PERFORMANCE CRITERIA**

appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of installing traction bonds has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT23A Traction Bonding

Evidence shall show an understanding of the installation of permanent traction bonds to an extent indicated by the following aspects:

T1 Traction bond and cables encompassing:

- Permanent bonding methods
- Applications for permanent bonding
- Components of permanent bonds
- Interface between traction and signalling circuits

T2 Safe working procedures/practices when carrying out permanent bonding encompassing:

- Personnel protective equipment (PPE)
- Electrical and visual testing on PPE

T3 Installation of temporary traction bonds and cables encompassing:

- Types and purpose of tools and equipment
- Installation and removal methods
- Testing for electrical integrity of bonds and cables

T4 Installation of permanent traction bonds and cables encompassing:

- Types and purposes of tools and equipment
- Installation and removal methods
- Testing for electrical integrity of bond, cables and equipment

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least two of the following:	Covered or bare aluminium bonds Copper bonds Steel bonds Steel rail
B	At least three of the following:	Bonding specific tools Crimping devices Thermal moulds Rail drill Bonding fittings Explosive power tools Portable hand tools
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation of traction bonds.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety

of environments.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRRT2 Install traction overhead wiring systems
1A

UETDRRT2 Install overhead traction components and
7A equipment

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation of the temporary and permanent traction bonds and bonding cables according to work plans.

Installation includes but is not limited to fitting, setting up and putting in place structures, conductors, bonding cables, equipment, spark gaps and connecting terminals and conducting tests for operational soundness.

Earthing and bonding systems may be permanent or temporary.

Types of conductors may include steel, steel rail, copper, aluminium and steel, bare and sheathed cables, single core, stranded and flexible.

Cables may be surfaced mounted, buried and enclosed.

Permanent jointing and terminating materials include polymeric tape materials, polymeric heat shrink and covering materials, exothermic welds, crimped and bolted connections.

Temporary terminating components include screwed and clipped earth/rail/conductor clamps.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures

RANGE STATEMENT

- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Rail Traction Units

UETDRRT24A Maintain rail traction bonds

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance and repair of the temporary and permanent traction bonds and bonding cables. It includes the undertaking of OHS and safe working practices on or about the running line/track. It also encompasses the isolation of systems and circuits for safe working according to work plans and the correct positioning of road signs, barriers and or warning devices and the procedure of issuing/accepting electrical permits. It also includes the visual inspection and other necessary checks to confirm that equipment and associated hardware are in a safe condition to test and/or return to service and the undertaking of re-commissioning tests to ensure the integrity of the bonding system prior to a return to service and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules,

Prerequisite Unit(s)	4)	standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTD RIS52A	Install and maintain poles, structures and associated hardware
	UETTD RIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTD RRT21A	Install traction overhead wiring systems
	UETTD RRT22A	Maintain traction overhead wiring systems
	UETTD RRT23A	Install rail traction bonds
	UETTD RRT27A	Install overhead traction components and equipment
	UETTD RRT28A	Maintain overhead traction components and equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare the maintenance of traction bonds	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the maintenance of traction bonds are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
1.5	Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
1.6	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
1.7	Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
1.8	Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue procedures according to requirements.
1.9	Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
1.12	Rail/Road signs, barriers and warning devices are positioned in accordance with requirements.
1.13	Environmental constraints applicable to work are identified and control measures applied.
2 Carry out maintenance of traction bonds	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working aloft, and use of

ELEMENT**PERFORMANCE CRITERIA**

- power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.
- 2.4 Essential knowledge and associated skills are applied in the safe maintenance and repair of traction bonds and bonding cables to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.5 Cable and surrounds, including rail and other surfaces, are prepared to enable joint and terminations to be carried out according to established procedures.
- 2.6 Maintenance is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.7 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.8 Unplanned events in the maintenance of traction bonds are undertaken within the scope of established procedures.
- 2.9 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.10 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the maintenance of traction bonds	<p>3.1 Work undertaken is checked and tested against design drawings and works schedule for conformance with requirements and anomalies reported in accordance with established procedures.</p> <p>3.2 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.</p> <p>3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.4 Relevant work permit(s) are signed off and, the system that has undergone the maintenance of a traction bond(s) is returned to service in accordance with requirements.</p> <p>3.5 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of maintaining traction bonds has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT24A Maintain traction bonds

Evidence shall show an understanding of the maintenance of traction bonding systems indicated by the following aspects:

T1 Traction bond and cables encompassing:

- Temporary and permanent bonding methods
- Applications for temporary and permanent bonding
- Components of temporary and permanent bonds
- Interface between traction and signalling circuits

T2 Safe working procedures/practices when carrying out temporary and permanent bonding encompassing:

- Personnel protective equipment (PPE)
- Electrical and visual testing on PPE

T3 Installation and removal of temporary traction bonds and cables encompassing:

- Types and purpose of tools and equipment
- Installation and removal methods
- Testing for electrical integrity of bonds and cables

T4 Maintenance of traction bond encompassing:

- Types and components
- Types and function of tools and equipment
- Maintenance/repair procedures
- Inspection and recording procedures

T5 Diagnose and correct simple faults in specific traction bonds encompassing:

- Types and causes
- Determination of appropriate corrective actions
- Repair and replace procedures

T6 Installation and removal of permanent traction bonds and cables encompassing:

- Types and purposes of tools and equipment
- Installation and removal methods

REQUIRED SKILLS AND KNOWLEDGE

- Testing for electrical integrity of bond, cables and equipment
- T7 Maintenance and repair of permanent traction bonds, cables and equipment

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing

on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of

contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least two of the following:	Covered or bare aluminium bonds Copper bonds Steel bonds Steel rail
B	At least three of the following:	Bonding specific tools Crimping devices Thermal moulds Rail drill

		Bonding fittings Explosive power tools Portable hand tools
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of traction bonds.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all

necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of the temporary and permanent traction bonds and bonding cables according to work plans.

Maintenance may include the removal, repair and replacement of bonds and bonding cables, conductors and associated hardware.

Maintenance includes the carrying out of diagnostics and tests on structures, conductors, equipment, spark gaps, systems as well as the removal, repair and replacement of bonding cables, spark gaps, conductors, and associated hardware and returning such to operational service.

Earthing and bonding systems may be permanent or temporary.

Types of conductors may include steel, steel rail, copper, aluminium and steel, bare and sheathed cables, single core, stranded and flexible.

Cables may be surfaced mounted, buried and enclosed.

Permanent jointing and terminating materials include polymeric tape materials, polymeric heat shrink and covering materials, exothermic welds, crimped and bolted connections.

Temporary terminating components include screwed and clipped earth/rail/conductor clamps.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures

RANGE STATEMENT

- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Rail Traction Units

UETDRRT25A Install overhead rail traction configurations

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation of overhead traction configurations, which include overlaps, cross-overs, turnouts, crossings and/or train/tram crossing. It includes the undertaking of safe working practices on or about the running line/track. It also encompasses; the isolation of systems and circuits for safe working according to work plans, the correct positioning of road signs, barriers and/or warning devices and the procedure for issuing/accepting electrical permits. It also includes the visual inspection and necessary checks to confirm that equipment and associated hardware have been correctly installed according to design and are in a safe condition to test prior to putting into service, as well as the undertaking of pre-commissioning tests and the updating of installation data and relevant quality assurance documentation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules,

Prerequisite Unit(s)	4)	standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTD RIS52A	Install and maintain poles, structures and associated hardware
	UETTD RIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETDRRT21A	Install traction overhead wiring systems
	UETDRRT22A	Maintain traction overhead wiring systems
	UETDRRT23A	Install rail traction bonds
	UETDRRT27A	Install overhead traction components and equipment
	UETDRRT28A	Maintain overhead traction components and equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the installation of overhead traction configurations	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the installation of overhead traction configurations are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
1.5	Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
1.6	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
1.7	Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
1.8	Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue procedures according to requirements.
1.9	Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
1.12	Rail/road signs, barriers and warning devices are positioned in accordance with requirements.
1.13	Environmental constraints applicable to work are identified and control measures applied.
2 Carry out the installation of overhead traction configurations	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working aloft, use of power

ELEMENT	PERFORMANCE CRITERIA
	tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.
	2.4 Essential knowledge and associated skills are applied in the safe installation of overhead traction configurations to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.5 Electrical equipment and associated hardware is positioned, secured and terminated/connected in accordance with requirements.
	2.6 Overhead traction configurations are installed as per requirements and established procedures.
	2.7 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.8 Unplanned events during the installation of overhead traction configurations are undertaken within the scope of established procedures.
	2.9 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.10 Ongoing checks of work quality are undertaken in accordance with instructions and established procedures.
3 Complete the installation of overhead traction configurations	3.1 Work undertaken is checked and tested against design drawings and works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.

ELEMENT**PERFORMANCE CRITERIA**

- 3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.4 Relevant work permit(s) are signed off after final inspections and the system is energised, tested and returned to service in accordance with requirements.
- 3.5 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of installing overhead traction configurations has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT25A Electrical traction configurations

Evidence shall show an understanding of the installation of overhead traction configurations indicated by the following aspects:

T1 Traction configuration principles encompassing:

- Types
- Purpose
- Assemblies
- Sub-assemblies
- Components

T2 Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, encompassing:

- Types of components
- Types and function of tools and equipment

T3 Installation of traction configurations encompassing:

- Installation methods
- Measurement of tolerances
- Recording of tolerances

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least three of the following:	Overlap Cross-over Turnout crossings Train/tram crossing
B	At least one of the following:	Elevating work platform Road/rail traction height access equipment. Ladders
C	At least two of the following:	Height gauge Stagger gauge Cant gauge
D	At least one of the following:	Voltage detector (LV or HV) Voltmeter Insulation resistance tester Field intensity tester
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a

workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation of overhead traction configuration.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRRT2 Operate rail road traction height access equipment
9A

UETDRRT3 Perform to a given schedule rail traction switching
0A operations

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and pre-commissioning tests of overhead traction configurations according to work plans, encompassing the isolation of systems and circuits for safe working.

Installation includes but is not limited to fitting, setting up, putting in place structures, conductors, equipment, systems and conducting tests for operational soundness.

Types of track configurations may include, overlaps, cross-overs, turnouts, 15-90 degree crossings, diamond crossings, Insulated crossings, train/tram crossing and tram frogs.

Overhead traction systems include their associated earthing systems.

Plant may include elevating work platforms, road rail traction height access equipment or ladder.

Testing and recording equipment (LV) include voltage detectors, volt meters and insulation resistance testers.

Testing and recording equipment (HV) includes voltage detectors and field intensity testers.

Permits may include access permits, permits to work and other relevant permits and documents by recognised bodies.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation

RANGE STATEMENT

- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Rail Traction Units

UETDRRT26A Maintain overhead rail traction configurations

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance and repair of overhead traction configurations, which include overlaps, cross-overs, turnouts, crossings and/or train/tram crossings. It includes the repair and/or replacement of “like for like” electrical equipment and associated hardware according to requirements and the undertaking of safe working practices on or about the running line/track, including the correct positioning of road signs, barriers and/or warning devices and the procedure for issuing/accepting electrical permits. It also encompasses the isolation of systems and circuits for safe working according to work plans and the visual inspection and necessary checks to confirm that equipment and associated hardware are in a safe condition to test and/or return to service as well as the undertaking of re-commissioning tests to ensure the integrity of the traction system prior to a return to service and the updating of system data and/or maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules,

Prerequisite Unit(s)	4)	standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTD RIS52A	Install and maintain poles, structures and associated hardware
	UETTD RIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTD RRT21A	Install traction overhead wiring systems
	UETTD RRT22A	Maintain traction overhead wiring systems
	UETTD RRT23A	Install rail traction bonds
	UETTD RRT25A	Install overhead rail traction configurations
	UETTD RRT27A	Install overhead traction components and equipment
	UETTD RRT28A	Maintain overhead traction components and equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in

Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to maintain overhead traction configurations	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 OHS policies and procedures related to requirements and established procedures for the maintenance of overhead traction configurations are obtained and confirmed for the purposes of the work to be performed and communicated.

ELEMENT**PERFORMANCE CRITERIA**

- 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
- 1.5 Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
- 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.8 Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue procedures according to requirements.
- 1.9 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Rail/road signs, barriers and warning devices are positioned in accordance with requirements.
- 1.13 Environmental constraints applicable to work are identified and control measures applied.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the maintenance of overhead traction configurations	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.</p> <p>2.2 Lifting, climbing, working aloft, use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.</p> <p>2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.</p> <p>2.4 Essential knowledge and associated skills are applied in the safe maintenance of overhead traction configurations to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.5 Electrical equipment and associated hardware is tested in accordance with requirements and established procedures.</p> <p>2.6 Maintenance, including repair and/or replacement of overhead traction configurations is carried out, in accordance with the work schedule and requirements/established procedures.</p> <p>2.7 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.8 Unplanned events during the maintenance of overhead traction configurations are undertaken within the scope of established procedures.</p> <p>2.9 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.</p> <p>2.10 Ongoing checks of quality of the work are undertaken in accordance with instructions and</p>

ELEMENT	PERFORMANCE CRITERIA
3 Complete the maintenance of overhead traction configurations	established procedures. 3.1 Work undertaken is checked and tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures. 3.2 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures. 3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. 3.4 Relevant work permit(s) are signed off after final inspections and recommissioning checks. The system is energised, tested and returned to service in accordance with requirements. 3.5 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of maintaining overhead traction configurations has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT26A Maintain overhead traction configurations

Evidence shall show an understanding of the maintenance of overhead traction configurations indicated by the following aspects:

T1 Traction configuration principles encompassing:

- Types
- Purpose
- Assemblies
- Sub-assemblies
- Components

T2 Maintenance of traction configurations encompassing:

- Types of components
- Types and function of tools and equipment
- Maintenance/repair procedures
- Inspection and recording procedures

T3 Diagnose and correct simple faults in specific traction configurations encompassing:

- Types and causes
- Determination of appropriate corrective actions
- Repair and replace procedures for components of specific configurations

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least three of the following:	Overlap Cross-over Turnout crossings Train/tram crossing
B	At least one of the following:	Elevating work platform Road/rail traction height access equipment, ladders
C	At least two of the following:	Height gauge Stagger gauge Cant gauge
D	At least one of the following:	Voltage detector (LV or HV) Voltmeter Insulation resistance tester Field intensity tester
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of overhead traction configuration.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance and pre-commissioning tests of overhead traction configurations according to work plans, encompassing the isolation of systems and circuits for safe working.

Maintenance includes the carrying out of diagnostics and tests on structures, conductors, equipment, systems as well as the removal, repair and replacement of cables, conductors, and associated hardware and returning such to operational service. It includes the repair and/or replacement of “like for like” electrical equipment and associated hardware

Types of track configurations that relate to overhead wiring and may include, overlaps, cross-overs, turnouts, 15 – 90 degree crossings, diamond crossings, insulated crossings, train/tram crossing, and tram frogs.

Overhead traction systems include their associated earthing systems.

Plant may include elevating work platforms, road rail traction height access equipment or ladder.

Testing and recording equipment (LV) include voltage detectors, volt meters and insulation resistance testers.

Testing and recording equipment (HV) includes voltage detectors and field intensity testers.

Permits may include access permits, permits to work and other relevant permits and documents by recognised bodies.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications
- Emergency

RANGE STATEMENT

- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Rail Traction Units

UETDRRT27A Install overhead traction components and equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation of the overhead traction electrical equipment and components as well as associated hardware including ancillary equipment. It includes the undertaking of safe working practices on or about the running line/track. It also encompasses the isolation of systems and circuits for safe working according to work plans and the correct positioning of road signs, barriers and or warning devices and the procedure of issuing/accepting electrical permits. It also includes the visual inspection and necessary checks to confirm that equipment, components and associated hardware have been correctly installed according to design and are in a safe condition to test prior to putting to service, the undertaking of pre-commissioning tests as required to ensure the integrity of the traction system prior to putting back into service and the updating of installation data and relevant quality assurance documentation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules,

Prerequisite Unit(s)	4)	standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI52A	Install and maintain poles, structures and associated hardware
	UETTDRI54A	Install and maintain poles, structures, overhead conductors and cables

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the installation of overhead traction equipment/components	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the installation of overhead traction equipment/components are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working</p>

ELEMENT	PERFORMANCE CRITERIA
	order.
	1.8 Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue procedures according to requirements.
	1.9 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
	1.11 Rail/road signs, barriers and warning devices are positioned in accordance with requirements.
	1.12 Environmental constraints applicable to work are identified and control measures applied.
2 Carry out the installation of overhead traction equipment/components	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.</p> <p>2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.</p> <p>2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.</p> <p>2.4 Essential knowledge and associated skills are applied in the safe installation of overhead traction equipment/components to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.5 Electrical components/equipment and associated hardware are positioned, secured and terminated/connected in accordance with</p>

ELEMENT**PERFORMANCE CRITERIA**

- requirements and established procedures.
- 2.6 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.7 Unplanned events during the installation of overhead traction equipment/components are undertaken within the scope of established procedures.
- 2.8 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.9 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 3 Complete the installation of overhead traction equipment/components
- 3.1 Work undertaken is checked against design drawings and works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
- 3.2 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.4 Relevant work permit(s) are signed off and, overhead traction equipment/components are commissioned in accordance with requirements.
- 3.5 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of installing overhead traction equipment and components has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT27A Overhead traction equipment and components

Evidence shall show an understanding of the installation of overhead traction equipment and components indicated by the following aspects:

T1 Overhead traction equipment encompassing:

- Types
- Purpose
- (Note: Examples include switches/isolators, fuse switches, links, section insulators, and fuses)

T2 Types of overhead components encompassing:

- Types
- Purpose
- (Note: Examples include cantilever hardware, droppers, bay components, portal hardware, head span hardware, section insulators, neutral sections, registration fittings, steady span, tension regulators and cross spans)

T3 Types of conductors used for overheads wiring such as hard-drawn, CAD, and tin-bearing copper, aluminium, steel, and other alloyed conductors

T4 Types of traction wire support structures that may consist of portals, cantilevers, drop pieces, head spans, cross spans and pull-offs

T5 Ancillary equipment

- Types
- Purpose
- (Note: Examples include surge arresters, booster and auxiliary transformers)

T6 Methods for installing conductors that may consist the use of:

- Preformed fittings
- Compression fittings
- Wedged fittings
- Bolted splices
- Lugs
- Bolted clamps

T7 Methods for installing components such as:

REQUIRED SKILLS AND KNOWLEDGE

- Feeders
- Droppers
- Dissimilar conductors
- Jumpers
- Surge arresters

T8 Use of plant and equipment for installation work, such as:

- Elevating work platforms
- Ladders
- Works trains
- Rail-mounted overhead wiring equipment/vehicles
- Road/rail height access machinery/vehicles
- Voltage detectors
- Micrometer/gauges
- Tension wrenches
- Dynamometers
- Other specialised tools

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is

recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and

range; and

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least two of the following:	Fuse switches Dropout fuses Section insulators Switches/isolators Links Fuses Surge diverters Transformers
B	At least five of the following:	Cantilever hardware Head span Neutral sections Pull offs Registration fittings Steady span Tension regulators

		Cross spans Tramway support network Pendulum
C	At least two of the following:	Preformed fittings Compression fittings Wedge fittings Bolted splices
D	At least three of the following:	Feeders Dissimilar conductors Lugs Bolted clamp Drapes/potential jumper Droppers
E	At least two of the following:	Voltage detectors Micrometer/gauge Tension wrench Dynamometer Specialised tools
F	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice

using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation of overhead traction equipment and components.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRRT2 Install traction overhead wiring systems
1A

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation, visual inspection and pre-commissioning tests of the overhead traction electrical equipment and components as well as associated hardware including ancillary equipment.

Installation includes but is not limited to fitting, setting up and putting in place conductors, equipment, systems and conducting tests for operational soundness.

Types of traction wire support structures may consist of portals, pull-off, drop-pieces, head spans, cross spans and tramway support networks.

Types of traction components may include droppers, bay components, cantilever hardware, portal hardware, steady spans hardware, steady spans, insulators, pull-off, tension regulators, section insulators, neutral sections, tramway frogs, pendulums, crossing pans and ears/hangers, booster and auxiliary transformers, air break switches, in-span feeders, isolation switches knuckles (insulated and non-insulated), cross arms.

Traction system components may consist of metalwork, wires, hardware, fittings and insulators.

Types of conductor may include HD, CAD and tin bearing copper, aluminium, steel, aluminium conductor steel reinforced, copper cover steel.

Types of wiring arrangements include single wire/tram systems, simple and compound catenary systems.

Plant may include ladders, elevating work platforms, winches, specialist tension string equipment, cable trailers, work trains, rail mounted overhead wiring equipment/vehicles and road rail mounted overhead wiring equipment/vehicles.

Ancillary equipment may include, transformers, switches, and surge diverters.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of

RANGE STATEMENT

- information
- Drawings and specifications
 - Emergency
 - Environmental and sustainable energy procedures
 - Environmental legislation
 - Environmental management documentation
 - Established procedures
 - Fall prevention
 - Hazards
 - Identifying hazards
 - Inspect
 - Legislation
 - MSDS
 - Notification
 - OHS practices
 - OHS issues
 - Permits and/or permits to work
 - Personnel
 - Quality assurance systems
 - Requirements
 - Testing procedures
 - Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Rail Traction Units

UETDRRT28A Maintain overhead traction components and equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance and repair of the overhead traction electrical equipment and components as well as associated hardware including ancillary equipment. It includes the repair or replacement of “like for like” electrical components/equipment and associated hardware and the undertaking of safe working practices on or about the running line/track. It also encompasses the isolation of systems and circuits for safe working according to work plans and the correct positioning of road signs, barriers and or warning devices and the procedure of issuing/accepting electrical permits. It also includes the visual inspection and necessary checks to confirm that equipment; components and associated hardware are in a safe condition to test and/or return to service, the re-commissioning tests of the electrical equipment, components and associated hardware and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules,

Prerequisite Unit(s)	4)	
		standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDNIS52A	Install and maintain poles, structures and associated hardware
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETDRRT27A	Install overhead traction components and equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged

Employability Skills

5)

will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Prepare to the maintenance of overhead traction equipment/components	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.3	OHS policies and procedures related to requirements and established procedures for the maintenance of overhead traction equipment/components are obtained and confirmed for the purposes of the work to be performed and communicated.
		1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
		1.5	Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
		1.6	Relevant work permits are obtained to access and perform work according to requirements and/or

ELEMENT	PERFORMANCE CRITERIA
	established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
	1.8 Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue procedures according to requirements.
	1.9 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.12 Rail/road signs, barriers and warning devices are positioned in accordance with requirements.
	1.13 Environmental constraints applicable to work are identified and control measures are applied.
2	2.1 Carry out the maintenance of overhead traction equipment/components OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.

ELEMENT	PERFORMANCE CRITERIA
2.4	Essential knowledge and associated skills are applied in the safe maintenance of overhead traction equipment/components to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
2.5	Electrical component/equipment and associated hardware is ascertained as operating within normal operating parameters and in accordance with requirements and established procedures.
2.6	Maintenance, including repair and/or replacement of overhead traction equipment/components is carried out, in accordance with the work schedule and requirements/established procedures.
2.7	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
2.8	Unplanned events during the maintenance of overhead traction equipment/components are undertaken within the scope of established procedures.
2.9	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
2.10	Ongoing checks/visual inspection of work quality are undertaken in accordance with instructions and established procedures.
3 Complete the maintenance of overhead traction equipment/components	3.1 Work undertaken is checked and or tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned,

ELEMENT**PERFORMANCE CRITERIA**

checked and returned to storage in accordance with established procedures.

3.4 Relevant work permit(s) are signed off after final inspections and the system is energised, tested and returned to service in accordance with requirements.

3.5 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of maintaining overhead traction equipment and components has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT28A Maintain overhead traction equipment and components

Evidence shall show an understanding of the maintenance of overhead traction equipment and components indicated by the following aspects:

T1 Overhead traction equipment encompassing:

- Types
- Purpose
- (Note: Examples include switches/isolators, fuse switches, links, section insulators, and fuses)

T2 Types of overhead components encompassing:

- Types
- Purpose
- (Note: Examples include cantilever hardware, droppers, bay components, portal hardware, head span hardware, section insulators, neutral sections, registration fittings, steady span, tension regulators and cross spans)

T3 Types of conductors used for overheads wiring such as hard-drawn, CAD, and tin-bearing copper, aluminium, steel, and other alloyed conductors

T4 Types of traction wire support structures that may consist of portals, cantilevers, drop pieces, head spans, cross spans and pull-offs

T5 Ancillary equipment

- Types
- Purpose
- (Note: Examples include surge arresters, booster and auxiliary transformers)

T6 Methods for replacing conductors that may consist the use of:

- Preformed fittings
- Compression fittings
- Wedged fittings
- Bolted splices
- Lugs
- Bolted clamps

T7 Methods for replacing components such as:

- Feeders
- Droppers
- Dissimilar conductors
- Jumpers

Surge arresters

Use of plant and equipment for maintenance work, such as:

Elevating work platforms

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment

instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables

Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least two of the following:	Fuse switches Dropout fuses Section insulators Switches/isolators Links Fuses Surge diverters Transformers
B	At least five of the following:	Cantilever hardware Head span Neutral sections Pull offs Registration fittings Steady span Tension regulators Cross spans Tramway support network Pendulum
C	At least two of the following:	Preformed fittings Compression fittings Wedge fittings Bolted splices
D	At least three of the following:	Feeders Dissimilar conductors Lugs Bolted clamp Drapes/potential jumper

		Droppers
E	At least two of the following:	Voltage detectors Micrometer/gauge Tension wrench Dynamometer Specialised tools
F	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of overhead traction equipment and components.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working maintaining overhead traction equipment and components, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRRT2 Maintain traction overhead wiring systems
2A

UETDRRT2 Install overhead traction components and
7A equipment

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance, visual inspection and pre-commissioning tests of the overhead traction electrical equipment and components as well as associated hardware including ancillary equipment.

Maintenance may include the carrying out of diagnostics and tests on conductors, equipment, systems as well as the removal, repair and replacement of cables, conductors, and associated hardware and returning such to operational service.

Types of traction wire support structures may consist of portals, pull-off, drop-pieces, head spans, cross spans and tramway support networks.

Types of traction components may include droppers, bay components, cantilever hardware, portal hardware, steady spans hardware, steady spans, insulators, pull-off arms, tension regulators, section insulators, neutral sections, tramway frogs, pendulums, crossing pans, ears/hangers, booster and auxiliary transformers, air break switches, in-span feeders, isolation switches, knuckles (insulated and non-insulated) and cross arms..

Traction system components may consist of metalwork, wires, hardware, fittings and insulators.

Types of conductor may include HD, CAD, and tin bearing copper, aluminium, steel, aluminium conductor steel reinforced and copper cover steel.

Types of wiring arrangements include single wire/tram systems, simple and compound catenary systems.

Plant may include ladders, elevating work platforms, winches, specialist tension string equipment, cable trailers, work trains, rail mounted overhead wiring equipment/vehicles and road rail mounted overhead wiring equipment/vehicles.

Ancillary equipment may include, transformers, switches, and surge diverters.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space

RANGE STATEMENT

- Diagnostic, testing and restoration
- Documenting detailed work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Rail Traction Units

UETDRRT29A Operate rail road traction height access equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the operation and use of road rail traction height access equipment to install and maintain the overhead traction systems. It includes the pre-operational inspection, servicing of plant/equipment and the undertaking of safe working practices on or about the running line/track. It also encompasses the isolation of systems and circuits for safe working according to work plans and the correct positioning of road signs, barriers and/or warning devices.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice**3)**

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits

Prerequisite Unit(s) 4)

- UETTDREL11A Apply sustainable energy and environmental procedures
- UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus
- UETTDREL16A Working safely near live electrical apparatus
- UETTDNIS52A Install and maintain poles, structures and associated hardware
- UETTDNIS54A Install and maintain poles, structures, overhead conductors and cables
- UETDRRT21A Install traction overhead wiring systems
- UETDRRT22A Maintain traction overhead wiring systems
- UETDRRT27A Install overhead traction components and equipment
- UETDRRT28A Maintain overhead traction components and equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability

Employability Skills

5)

Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Prepare to operate road rail traction height access equipment	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.3	OHS policies and procedures related to requirements and established procedures for the operation of road rail traction height access equipment are obtained and confirmed for the purposes of the work to be performed and communicated.
		1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
		1.5	Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.

ELEMENT	PERFORMANCE CRITERIA
1.6	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
1.7	Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
1.8	Pre-operational inspection servicing of plant/equipment is carried out as per established procedures.
1.9	Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue procedures and other related work procedures according to requirements.
1.10	Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
1.12	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
1.13	Rail/road signs, barriers and warning devices are positioned in accordance with requirements.
1.14	Environmental constraints applicable to work are identified and control measures applied.
2 Carry out the operation of road rail traction height access equipment	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working aloft, and use of

ELEMENT**PERFORMANCE CRITERIA**

- power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Essential knowledge and associated skills are applied in the safe operation of road rail traction height access equipment to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.4 Road rail traction height access equipment is operated as per requirements and established procedures.
- 2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.6 Unplanned events during the operation of road rail traction height access equipment are undertaken within the scope of established procedures.
- 2.7 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.8 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 3 Complete the operation of road rail traction height access equipment
- 3.1 Post operational checking and servicing of plant and equipment is carried out for conformance with requirements/established procedures and anomalies reported in accordance with established procedures.
- 3.2 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.

ELEMENT**PERFORMANCE CRITERIA**

- 3.4 Relevant work permit(s) are signed off and, the road rail traction height access equipment is returned in accordance with established procedures.
- 3.5 Works completion records and reports, are processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of operating road rail traction height access equipment has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT29A Road/rail traction height access equipment

Evidence shall show an understanding of the operation of road rail and rail/tram traction height access equipment used in the installation and maintenance of overhead traction system to an extent indicated by the following aspects:

T1 Operator requirements encompassing:

- Pre-operational checks
- Recording procedures e.g. logbook

T2 Road/rail traction height access equipment operation encompassing:

- Equipment characteristics, capabilities and limitations
- Prestart requirements
- Operation procedure
- Basic problem solving equipment faults
- Safe working procedures when mechanical failure occurs
- Use of appropriate communication systems
- Permit to work systems and isolation procedures

T3 Safe working and safety requirements when using road/rail traction height access equipment

T4 Procedures for effective traffic management

T5 Electrical safety requirements prior to operating equipment under live overhead equipment and adjacent to or in the vicinity of live overhead equipment

T6 Emergency procedures in the event of an electrical incident/accident

T7 Emergency procedures in the event of a safe working/road traffic incident/accident

T8 OHS and EPA requirements in the context of Commonwealth/State/Territory legislative requirements

T9 Rescue a person from a height access equipment encompassing:

- Methods for rescuing a person
- Methods for rescuing a person from a disabled height access equipment
- Methods for rescuing an incapacitated person from a height access equipment
- Methods for rescuing a person in contact with live overhead equipment

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment

instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables

Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Log books Work plan
B	At least one of the following:	Elevated work platforms in the performance of work associated with rail traction. Road rail platform vehicle in the performance of work associated with rail traction.
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual operation of road rail height access equipment.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency operating road rail traction height access equipment,

with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRRT22A Maintain traction overhead wiring systems

UETDRRT28A Maintain overhead traction components and equipment

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the operation and use of road rail traction height access equipment as it relates to installation and maintenance of the overhead traction systems, including any pre-operational inspection and servicing of plant/equipment.

Plant may include elevating work platforms, winches, specialist tension string equipment, cable trailers, rail and road mounted overhead vehicles and vehicle mounted cranes. Excluding rail bound overhead wiring consist.

Equipment operation includes the horizontal and vertical operation of the work platform, pre-operational checks, obtaining appropriate relevant track or road authorities, observing relevant statutory electrical and mechanical clearances, and communication protocol between relevant personnel.

Operating environment may include off-track, on-track in the vicinity of live and dead traction and distribution equipment, live line working and within an operational road, rail or tram traffic environment.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detailed work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards

RANGE STATEMENT

- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
Rail Traction Units

UETDRRT30A Perform to a given schedule rail traction switching operations

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the operation of circuit breaking and isolation devices associated with energy reticulation systems/networks, which applies to rail systems in field situations according to established procedures. It also encompasses the procedure of; communicating with the Switching Control Officer or Electrical Control Officer, isolating the electrical equipment and the line or work site, as well as proving that the area is de-energised and earthed or rail-connected, the issuing/accepting or holding of electrical permits and the returning of the affected circuits to service

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice**3)**

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c.

Prerequisite Unit(s) 4)**Circuits**

- UETTDREL11A Apply sustainable energy and environmental procedures
- UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus
- UETTDREL16A Working safely near live electrical apparatus
- UETTDNIS52A Install and maintain poles, structures and associated hardware
- UETTDNIS54A Install and maintain poles, structures, overhead conductors and cables
- UETDRRT21A Install traction overhead wiring systems
- UETDRRT22A Maintain traction overhead wiring systems
- UETDRRT27A Install overhead traction components and equipment
- UETDRRT28A Maintain overhead traction components and equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of

Employability Skills

5)

competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

- | | | | |
|---|--|-----|---|
| 1 | Prepare for rail traction switching operations to a given schedule | 1.1 | Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection. |
| | | 1.2 | Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites. |
| | | 1.3 | OHS policies and procedures related to requirements and established procedures for rail traction switching operations to a given schedule are obtained and confirmed for the purposes of the work to be performed and communicated. |
| | | 1.4 | Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures. |
| | | 1.5 | Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures. |

ELEMENT	PERFORMANCE CRITERIA
	1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
	1.8 Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue procedures and related work procedures according to requirements.
	1.9 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Modifications to the scheduled which may be required after assessing the worksite is communicated to appropriate personnel for formal approval.
	1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.12 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.13 Safe working, road signs, barriers and warning devices are in place in accordance with requirements.
2 Carry out rail traction switching operations to a given schedule	2.1 OHS principles and practices to reduce incidents and accidents are followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.

ELEMENT**PERFORMANCE CRITERIA**

- | | |
|-----|--|
| 2.3 | Essential knowledge and associated skills are applied in the safe switching of rail traction operations to ensure completion in an agreed timeframe and, to quality standards. |
| 2.4 | Communications with Switching Control Officer are established and maintained throughout the isolation operation according to established procedures. |
| 2.5 | Electrical equipment and associated circuits line/network or work site to be switched is isolated and proved de-energised using appropriate devices and earthed or rail connected where required according to requirements and established procedures. |
| 2.6 | Rail traction switching to a schedule is carried out, in accordance with requirements/established procedures. |
| 2.7 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| 2.8 | Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills. |
| 2.9 | Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures. |
| 3 | Complete the rail traction switching operations to a given schedule |
| 3.1 | Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures. |
| 3.2 | Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable. |
| 3.3 | Work site is rehabilitated, cleaned up and made safe in accordance with established procedures. |
| 3.4 | Tools, equipment and any surplus resources and |

ELEMENT**PERFORMANCE CRITERIA**

- materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off, safety devices are removed, and the system is made ready to be re-energised and returned to service in accordance with requirements/established procedures.
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel and authority notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of performing rail traction switching operations to a given schedule has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT30A Rail traction switching

Evidence shall show an understanding of rail traction switching operations to an extent indicated by the following aspects:

T1 Installation of overhead distribution conductors encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length.
- Constructions types and structures for distribution and sub transmission lines
- Types, sizes and characterises of overhead conductors
- Resources for the stringing and maintenance of conductors - types of low and high voltage overhead electrical conductor connections, causes and effects of poor electrical connections, reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors, minimum clearances between overhead conductors and low and high voltage structures.
- Techniques for conductor installation - types and application of tools, equipment and hardware
- Methods of stringing, tensioning and termination of low and high voltage conductors

T2 Safe working practices and procedures for the installation of overhead distribution conductors encompassing:

- Limits of approach for personnel, vehicles, mobile plant and elevating work platforms (EWP)
- Requirements of persons prior to making bare hand contact with dead low voltage mains and apparatus
- Requirements of relevant electrical access permits necessary to allow work to be performed on low and high voltage apparatus
- Safe working practices - requirements to enable safe working on conductive poles, procedure to attach an “on-site” earthing device to de-energised low and high voltage overhead circuit

T3 Installation of switchgear and associated equipment encompassing:

- Types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit

REQUIRED SKILLS AND KNOWLEDGE

breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques

- Types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- Installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques, pole mounted locations
- Maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry standards and procedures,
- Testing and commissioning - electricity supply industry standards and procedures.

T4 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this

shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Approvals/clearances, Electrical/access permits
B	At least one of the following:	Voltage detectors, Field intensity meter, Polarity testers, Phase rotation indicators
C	At least one of the following:	HV/LV circuit breakers, HV/LV switches, HV/LV isolators,

		HV/LV links, HV/LV bridges, HV/LV fuses
D	All of the following:	Portable earthing/rail-connecting equipment, Operating rods/sticks
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual performance of rail traction switching operations.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRRT29A Operate rail road traction height access equipment

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the switching of circuit breaking and isolation devices associated with energy reticulation systems/networks, which applies to rail systems in field situations.

Equipment may include; circuit breakers, isolators, links, fuses, field switches, air-break switches, gas switches, Low Voltage switches, combined rail isolating switches, siding switches, earthing/ rail connect equipment, test equipment, High Voltage gloves, High Voltage mats, operating rods/sticks, aerial switches and motor driven switches, voltage detectors

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Rail Traction Units

UETDRRT31A Maintain energised d.c. traction overhead wiring system

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance and repair of energised DC traction Overhead Wiring system through the use of insulated ladder and working bare hand or insulated stick and includes the verification of the site conditions and the potential hazards, the conformance with and calculation of mechanical loads, the selection of appropriate tools and equipment, and authorised work method. It includes the undertaking of OHS and safe working practices to ensure that correct procedures and precautions to working live in accordance with the work plan and enterprise requirements are followed. It also includes; the visual inspection and necessary checks to confirm that overhead wiring components and associated hardware are in a safe condition to test and/or return to service, the re-commissioning tests of the components and associated hardware and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Pathway 1

Qualified and authorised Rail Traction Lineworker

Pathway 2

BSBWOR402A Promote team effectiveness

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. Circuits

UEENEEE105A Fix and secure electrotechnology

Prerequisite Unit(s)	4)	equipment
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDNIS52A	Install and maintain poles, structures and associated hardware
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDNIS65A	Contribute to coordinated HV live working
	UETDRRT21A	Install traction overhead wiring systems
	UETDRRT22A	Maintain traction overhead wiring systems
	UETDRRT23A	Install rail traction bonds
	UETDRRT25A	Install overhead rail traction configurations
	UETDRRT26A	Maintain overhead rail traction configurations
	UETDRRT27A	Install overhead traction components and equipment
	UETDRRT28A	Maintain overhead traction

Prerequisite Unit(s) 4)

components and equipment

UETDRRT29A Operate rail road traction height access equipment.

UETDRRT99A Test and verify rail traction installations

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to maintain energised DC traction overhead wiring systems	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.</p> <p>1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.</p> <p>1.3 Risk control measures are identified, prioritised and evaluated against the work schedule.</p> <p>1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.</p> <p>1.6 Relevant work authority/instructions are secured to coordinate the performance of work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.</p> <p>1.8 Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.</p> <p>1.9 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.</p>

ELEMENT	PERFORMANCE CRITERIA
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
	1.12 Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements.
2 Carry out maintenance of energised DC traction overhead wiring systems	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
	2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures.
	2.3 Lifting, climbing, working aloft, and use of tools/equipment, techniques and practices are safely exercised according to requirements.
	2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
	2.6 Maintenance of energised direct current traction overhead wiring systems is carried out, in accordance with the work schedule and requirements and/or established procedures.
	2.7 Essential knowledge and associated skills are applied in the safe maintenance of energised direct current traction overhead wiring systems to

ELEMENT**PERFORMANCE CRITERIA**

		ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
3	Complete the maintenance of energised DC traction overhead wiring systems	
	3.1	Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
	3.3	Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5	Relevant work Authority/Instruction(s) are signed off or returned to client/customer in accordance with requirements.
	3.6	Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of maintaining energised direct current traction overhead wiring systems has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT31A Energised d.c. traction overhead wiring system

Evidence shall show an understanding of working on energised d.c. traction overhead wiring system to an extent indicated by the following aspects:

T1 Basic rigging techniques encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with rigging including the operation of cranes, hoists and winches and relevant certification and licensing (if required)
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Safe use of rigging equipment, tools and associated equipment - types, techniques and application
- Site inspection procedures - identifying hazards, assessing and controlling risks, appropriate sequence of loading and unloading
- Determining the mass and dimensions of load
- Selection and inspection procedures - rigging equipment, materials and tools (natural and synthetic fibre ropes and chains, fittings, winch and capstan), ratings of wire ropes and slings, removing, repairing and replacing of damage parts.
- Techniques for assembling and erecting power winches and capstans
- Checking the integrity of support structure; visual inspection of load connections
- Techniques in moving, lifting, shifting, managing and placing loads - use of appropriate communication and signalling methods, codes of practice/compliance, enterprise and Commonwealth, State/Territory legislative requirements, weather conditions, erection of safety nets and lines, methods of fixing and anchoring loads, load stability.

T2 Installation of overhead distribution conductors encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length.
- Constructions types and structures for distribution and sub transmission lines
- Types, sizes and characterises of overhead conductors
- Resources for the stringing and maintenance of conductors - types of low and high voltage overhead electrical conductor connections, causes and effects of poor

REQUIRED SKILLS AND KNOWLEDGE

electrical connections, reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors, minimum clearances between overhead conductors and low and high voltage structures.

- Techniques for conductor installation - types and application of tools, equipment and hardware
- Methods of stringing, tensioning and termination of low and high voltage conductors

T3 Safe working practices and procedures for the installation of overhead distribution conductors encompassing:

- Limits of approach for personnel, vehicles, mobile plant and elevating work platforms (EWP)
- Requirements of persons prior to making bare hand contact with dead low voltage mains and apparatus
- Requirements of relevant electrical access permits necessary to allow work to be performed on low and high voltage apparatus
- Safe working practices - requirements to enable safe working on conductive poles, procedure to attach an “on-site” earthing device to de-energised low and high voltage overhead circuit

T4 Safe working on energised low voltage equipment encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on or near energised low voltage conductors - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.
- Work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, release and rescue procedures for work on or near exposed energised LV conductors.

T5 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker’s body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements,

REQUIRED SKILLS AND KNOWLEDGE

and the practical procedure of climbing an overhead structure and fitting a pole chair

- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

T6 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

T7 Safe working on energised DC traction equipment encompassing:

- Commonwealth/State/Territory/local government legislation, Standards, codes, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on energised LV DC Traction overhead conductors and cables - safe approach distances, safe working practices, instructions and procedures, Occupational Health and Safety hazards and precautions, identification of OHS hazards, assessment and control of OHS risks, types, selection, maintenance, storage and use of personal protective equipment, dangers of working in confined spaces and at heights, notification to work systems, safe working policies, procedures and practices when using/operating specialised equipment and tools, emergency response and rescue including First Aid etc.
- Techniques in installation, maintenance, replacing and repairing of energised DC traction overhead conductors, cables and equipment - span, cross-span, head-span,

REQUIRED SKILLS AND KNOWLEDGE

section insulator, support equipment, tramway support network, catenary, dropper, contact/trolley, feeder/ in-span feeder, drape/potential jumper

- Techniques in carrying out work on energised DC traction overhead conductors, cables and equipment - removing trapped foreign objects, profiling, vertical adjustment of contact or trolley wire
- Techniques in using plant, equipment and/or tools to carry out work on energised DC traction overhead conductors, cables and equipment - insulated elevating work vehicles, insulated ladder, insulated work platforms, tensioning equipment, insulated sticks, ropes, slings, and chains.

T8 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T9 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T10 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs,

REQUIRED SKILLS AND KNOWLEDGE

technical manuals and catalogues

- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and

- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least two of the following:	Span, cross-span, headspan, section insulator, support equipment, tramway support network
B	At least three of the following;	Catenary, dropper, contact/trolley, feeder/in-span feeder, drape/potential jumper
C	At least two of the following:	Removal of trapped foreign objects Profiling Vertical adjustment of contact or trolley wire
D	At least one of the following;	Insulated elevating work vehicles Insulated ladder Insulated work platforms
E	At least two of the following:	Tensioning equipment Insulated sticks Ropes Slings and chains Geometry profiling equipment.
F	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and

		associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of energised DC traction overhead wiring systems

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit..

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance and repair of energised direct current traction overhead wiring systems, working bare handed on insulated ladders or insulated work platforms, or using insulated sticks.

The work may include installing, maintaining, repairing or replacing droppers, in-span feeders, catenary wire, contact/trolley wire, feeder wire, drape/potential jumper wire, cross-span, networks and head span wire, section insulators and components.

Work may also include removing foreign objects trapped on overhead wiring system.

Profiling encompasses sag, tension, encumbrances, offsets, cants and registration this involves horizontal and vertical adjustment of the contact wire or trolley wire to a design height and stagger in reference to the running rail.

Materials and equipment may include porcelain, glass, ceramic, fibre glass and composite insulators, steel, brass, stainless steel, neoprene, copper, cast and galvanized fittings, drums, pulleys, hooks, yoke plate, line grips, ropes, slings, hydraulic/manual crimping and cutting tools, specialized tools and dynamometers.

Types of traction components may include droppers, bay components, steady spans hardware, steady spans, pull-off, section insulators, neutral sections, tramway frogs, pendulums, crossing pans and ears/hangers, troughing, 15 – 900 crossings, in-span feeders, isolation switches knuckles (insulated and non-insulated), and cross arms.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation

RANGE STATEMENT

- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Rail Traction Units

UETDRRT32A Maintain energised traction overhead electrical apparatus using stick techniques

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance and repair of energised traction overhead electrical apparatus via the use of approved live line insulated stick techniques and includes the verification of site conditions and the potential hazards, the conformance with and calculation of physical loads, the selection of appropriate tools and equipment, and authorised work methods. It encompasses the undertaking of correct procedures and precautions to working live line in accordance with the work plan and enterprise requirements. It also includes the visual inspection and necessary checks to confirm that; the electrical apparatus and components are in a safe condition to test and/or return to service, and the recommissioning tests of the electrical apparatus and components.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Pathway 1

Qualified and authorised Rail Traction Lineworker

Pathway 2

BSBWOR402A	Promote team effectiveness
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology

Prerequisite Unit(s)	4)	equipment
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI52A	Install and maintain poles, structures and associated hardware
	UETTDRI54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDRI65A	Contribute to coordinated HV live working
	UETDRRT21A	Install traction overhead wiring systems
	UETDRRT22A	Maintain traction overhead wiring systems
	UETDRRT23A	Install rail traction bonds
	UETDRRT25A	Install overhead rail traction configurations
	UETDRRT26A	Maintain overhead rail traction configurations
	UETDRRT27A	Install overhead traction components and equipment

Prerequisite Unit(s) 4)

UETDRRT28A	Maintain overhead traction components and equipment
UETDRRT29A	Operate rail road traction height access equipment.
UETDRRT31A	Maintain energised d.c. traction overhead wiring system
UETDRRT99A	Test and verify rail traction installations

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to maintain energised traction overhead electrical apparatus	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
	1.3 Calculation of physical loads and authorised work methods are obtained and relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.4 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.5 Identify hazards associated with the work and implement risk control measures including the rendering inoperative of automatic reclosing device.
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
	1.8 Relevant personnel at worksite are confirmed current in First Aid, CPR, Pole Top and other rescue procedures according to requirements.
	1.9 Liaison and communication issues with other

ELEMENT

PERFORMANCE CRITERIA

- authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
- 1.12 Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements.
- 2 Carry out the maintenance of energised traction overhead electrical apparatus
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
- 2.2 First Aid, CPR, Pole Top and other Rescue Procedures and other related work procedures are performed according to requirements and/or established procedures.
- 2.3 Lifting, climbing, and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.
- 2.4 Auto-reclose devices associated with the circuits being worked on have been rendered inoperative and necessary work documentation acquired in accordance with enterprise requirements.
- 2.5 Essential knowledge and associated skills are applied in the safe maintenance of energised traction overhead electrical apparatus to ensure completion within an agreed timeframe and to quality standards with a minimum of waste according to requirements.
- 2.6 Hazard warnings and safety signs are recognised

ELEMENT

PERFORMANCE CRITERIA

- and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.7 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
- 2.8 Unplanned events in the maintenance of energised traction overhead electrical apparatus are managed within the scope of established procedures.
- 2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
- 3 Complete the maintenance of energised traction overhead electrical apparatus
- 3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
- 3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
- 3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work documentation is signed off and, traction overhead electrical apparatus are returned to service, including returning of auto-reclosing device to normal, and advised to client/customer in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and

ELEMENT

PERFORMANCE CRITERIA

appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of maintaining energised traction overhead electrical apparatus (stick) has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT32A Energised traction overhead electrical apparatus using stick techniques

Evidence shall show an understanding of working on energised traction overhead electrical apparatus using stick techniques to an extent indicated by the following aspects:

T1 Basic rigging techniques encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with rigging including the operation of cranes, hoists and winches and relevant certification and licensing (if required)
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Safe use of rigging equipment, tools and associated equipment - types, techniques and application
- Site inspection procedures - identifying hazards, assessing and controlling risks, appropriate sequence of loading and unloading
- Determining the mass and dimensions of load
- Selection and inspection procedures - rigging equipment, materials and tools (natural and synthetic fibre ropes and chains, fittings, winch and capstan), ratings of wire ropes and slings, removing, repairing and replacing of damage parts.
- Techniques for assembling and erecting power winches and capstans
- Checking the integrity of support structure; visual inspection of load connections
- Techniques in moving, lifting, shifting, managing and placing loads - use of appropriate communication and signalling methods, codes of practice/compliance, enterprise and Commonwealth, State/Territory legislative requirements, weather conditions, erection of safety nets and lines, methods of fixing and anchoring loads, load stability.

T2 Installation of overhead distribution conductors encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing conductors and associated equipment
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length.
- Construction types and structures for distribution and sub transmission lines
- Types, sizes and characterises of overhead conductors

REQUIRED SKILLS AND KNOWLEDGE

- Resources for the stringing and maintenance of conductors - types of low and high voltage overhead electrical conductor connections, causes and effects of poor electrical connections, reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors, minimum clearances between overhead conductors and low and high voltage structures.
- Techniques for conductor installation - types and application of tools, equipment and hardware
- Methods of stringing, tensioning and termination of low and high voltage conductors

T3 Safe working practices and procedures for the installation of overhead distribution conductors encompassing:

- Limits of approach for personnel, vehicles, mobile plant and elevating work platforms (EWP)
- Requirements of persons prior to making bare hand contact with dead low voltage mains and apparatus
- Requirements of relevant electrical access permits necessary to allow work to be performed on low and high voltage apparatus
- Safe working practices - requirements to enable safe working on conductive poles, procedure to attach an “on-site” earthing device to de-energised low and high voltage overhead circuit

T4 Safe working on energised low voltage equipment encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on or near energised low voltage conductors - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.
- Work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, release and rescue procedures for work on or near exposed energised LV conductors.

T5 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker’s body belt, application of

REQUIRED SKILLS AND KNOWLEDGE

knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair

- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

T6 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

T7 Safe working on energised DC traction equipment encompassing:

- Commonwealth/State/Territory/local government legislation, Standards, codes, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on energised LV DC Traction overhead conductors and cables - safe approach distances, safe working practices, instructions and procedures, Occupational Health and Safety hazards and precautions, identification of OHS hazards, assessment and control of OHS risks, types, selection, maintenance, storage and use of personal protective equipment, dangers of working in confined spaces and at heights, notification to work systems, safe working policies, procedures and practices when using/operating specialised equipment and tools, emergency response and rescue including First Aid etc.

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in installation, maintenance, replacing and repairing of energised DC traction overhead conductors, cables and equipment - span, cross-span, head-span, section insulator, support equipment, tramway support network, catenary, dropper, contact/trolley, feeder/ in-span feeder, drape/potential jumper
- Techniques in carrying out work on energised DC traction overhead conductors, cables and equipment - removing trapped foreign objects, profiling, vertical adjustment of contact or trolley wire
- Techniques in using plant, equipment and/or tools to carry out work on energised DC traction overhead conductors, cables and equipment - insulated elevating work vehicles, insulated ladder, insulated work platforms, tensioning equipment, insulated sticks, ropes, slings, and chains.

T8 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T9 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T10 Enterprises specific — technical drawing and documents encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

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Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries

risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures;
and

- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least two of the following:	Support structure Span Section insulator Neutral section Midpoint anchor Support equipment Tension regulators
B	At least two of the following:	Catenary Dropper Contact feeder
C	At least one of the following:	Insulated elevating work platform Insulated ladder Insulated mobile platform
D	At least two of the following:	Specialised insulated tools Insulated sticks Tensioning equipment Geometry profiling equipment.
E	At least two of the following:	Air-break switches Insulators Surge arrestors

		Hardware and fittings
F	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of energised traction overhead electrical apparatus.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills

described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRRT3 3A Maintain energised traction overhead electrical apparatus using glove techniques

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of energised traction overhead electrical apparatus by the adoption of live line insulated stick techniques, without the need to interrupt traction power supply during the course of work undertaking. Competency shall be demonstrated in relation to the maintenance, visual inspection and pre-commissioning tests of the overhead traction electrical equipment and components as well as associated hardware including ancillary equipment.

Maintenance may include the carrying out of diagnostics and tests on conductors, equipment, systems as well as the removal, repair and replacement of cables, conductors, and associated hardware and returning such to operational service.

Types of traction wire support structures may consist of portals, pull-off, drop-pieces, head spans, and cross spans.

Types of traction components may include switches, surge arresters, insulators, droppers, bay components, cantilever hardware, portal hardware, steady spans hardware, steady spans, insulators, pull-off arms, tension regulators, section insulators, neutral sections, air break switches, in span feeders, isolation switches, knuckles (insulated and non-insulated) and cross arms.

Traction system components may consist of metalwork, wires, hardware, fittings and insulators.

Types of conductor may include HD, CAD, and Tin Bearing copper, aluminium, steel, aluminium conductor steel reinforced, copper cover steel.

Types of wiring arrangements include single wire systems, simple and compound catenary systems.

Plant may include live-line tools, insulated ladders, insulated elevating work platforms/vehicles/trains, specialist tension string equipment, wire drums

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space

RANGE STATEMENT

- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Rail Traction Units

UETDRRT33A Maintain energised traction overhead electrical apparatus using glove techniques

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance and repair of energised traction overhead electrical apparatus via the use of approved live line glove and barrier techniques and includes the verification of site conditions and the potential hazards, the conformance with and calculation of physical loads, the selection of appropriate tools and equipment, and authorised work methods. It encompasses the undertaking of correct procedures and precautions to working live line in accordance with the work plan and enterprise requirements. It also includes the visual inspection and necessary checks to confirm that the electrical apparatus and components are in a safe condition to test and/or return to service, and the recommissioning tests of the electrical apparatus and components.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Pathway 1

Qualified and authorised Rail Traction Lineworker

Pathway 2

BSBWOR402A Promote team effectiveness

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE104A Solve problems in d.c. Circuits

UEENEEE105A Fix and secure electrotechnology

Prerequisite Unit(s)	4)	equipment
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTD RIS52A	Install and maintain poles, structures and associated hardware
	UETTD RIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTD RIS65A	Contribute to coordinated HV live working
	UETTD RRT21A	Install traction overhead wiring systems
	UETTD RRT22A	Maintain traction overhead wiring systems
	UETTD RRT23A	Install rail traction bonds
	UETTD RRT25A	Install overhead rail traction configurations
	UETTD RRT26A	Maintain overhead rail traction configurations
	UETTD RRT27A	Install overhead traction components and equipment
	UETTD RRT28A	Maintain overhead traction components and equipment

Prerequisite Unit(s) 4)

- UETDRRT29A Operate rail road traction height access equipment.
- UETDRRT31A Maintain energised d.c. traction overhead wiring system
- UETDRRT99A Test and verify rail traction installations

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to maintain energised traction overhead electrical apparatus (glove)	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.
	1.2 Calculation of physical loads and authorised work methods are obtained and relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
	1.5 Hazards associated with the work and implement risk control measures including the rendering inoperative of automatic reclosing device are identified.
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
	1.8 Relevant personnel at worksite are confirmed current in First Aid, CPR, Pole Top and other rescue procedures according to requirements.
	1.9 Liaison and communication issues with other

ELEMENT

PERFORMANCE CRITERIA

- authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
- 1.12 Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements.
- 2 Carry out the maintenance of energised traction overhead electrical apparatus (glove)
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
- 2.2 First Aid, CPR, Pole Top and other Rescue Procedures and other related work procedures are performed according to requirements and/or established procedures.
- 2.3 Lifting, climbing, and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.
- 2.4 Auto-reclose devices associated with the circuits being worked on have been rendered inoperative and necessary work documentation acquired in accordance with enterprise requirements.
- 2.5 Essential knowledge and associated skills are applied in the safe maintenance of energised traction overhead electrical apparatus to ensure completion within an agreed timeframe and to quality standards with a minimum of waste according to requirements.
- 2.6 Hazard warnings and safety signs are recognised

ELEMENT

PERFORMANCE CRITERIA

- and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.7 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
- 2.8 Solutions to non-routine problems are identified and actioned in the maintenance of energised traction overhead electrical apparatus using acquired essential knowledge and associated skills according to requirements and established procedures.
- 2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
- 3 Complete the maintenance of energised traction overhead electrical apparatus (glove)
- 3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
- 3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
- 3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work documentation is signed off and, traction overhead electrical apparatus are returned to service, including returning of auto-reclosing device to normal, and advised to client/customer in accordance with requirements.
- 3.6 Works completion records, reports, as installed

ELEMENT

PERFORMANCE CRITERIA

/modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of maintaining energised traction overhead electrical apparatus (glove) has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT33A Energised traction overhead electrical apparatus using glove techniques

Evidence shall show an understanding of working on energised traction overhead electrical apparatus using glove techniques to an extent indicated by the following aspects:

T1 Working on energised lines to 33 kV using live line glove and barrier techniques encompassing:

- Commonwealth/State/Territory legislation, Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with working on energised lines to 33 kV (poles) using live line glove and barrier techniques
- Safety precautions working on energised lines to 33 kV using live line HV rubber gloving techniques - live line minimum approach distances persons and plant, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment, live line access authority/permit system, disabling auto-reclosing function, ensuring functioning of fault current protective devices, checking integrity of insulation prior to work commencement, types and function of specialised live line working equipment and tools inspection before use, safe working policies, procedures and practices when using/operating specialised equipment and tools, methods of using specialised equipment and tools, work team communication, use of safety observers, emergency response and rescue including First Aid etc.
- Policies and procedures dealing with general work practices - definitions of terms used, responsibilities of personnel, types of structures from which glove and barrier methods can be performed, types of equipment and their compliance with relevant standards.
- Relationship between combined glove and barrier and stick methods - conditions under which they can be practiced.
- Techniques in installing and/or replacing HV insulators when working live line glove and barrier - intermediate insulators, angle insulators, bridging insulators, strain insulators and suspension insulators.
- Techniques in erecting and/or replacing HV cross-arms when working live line glove and barrier - intermediate, angle, strain, termination and suspension.
- Techniques in connecting and/or disconnecting HV bridges connections when working live line glove and barrier - strain/"Tee" bridges, bypass

REQUIRED SKILLS AND KNOWLEDGE

bridges/connections, HV A. B. C. and similar/dissimilar metals.

- Techniques in the installation and/or maintenance of electrical equipment - air break switches, gas switches, fuse assemblies, isolators, bird covers, surge diverters and fault indicators. Techniques in erecting and/or removing temporary midspan switching devices
- Techniques using live line glove and barrier to erect and/or replace of poles - intermediate, angle, strain.
- Techniques using live line glove and barrier for the repair and or replacing of HV conductors/cables
- Techniques in repairing and/or replacing HV armour rods and/or line guards
- Conversion methods using live line glove and barrier, of intermediate construction to strain construction.

T2 Working on energised lines to 33 kV (poles) using live line glove and barrier/hotstick combined encompassing:

- Commonwealth/State/Territory legislation, Standards, codes, supply authority regulations and or enterprise requirements associated with working on energised lines to 33 kV (poles) using live line glove and barrier/hotstick combined
- Safety precautions working on energised lines to 33 kV using live line glove and barrier/hotstick combined - live line minimum approach distances persons and plant, Occupational Health and Safety hazards and precautions, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment, live line access authority/permit system, disabling auto-reclosing function, ensuring functioning of fault current protective devices, checking integrity of insulation prior to work commencement, types and function of specialised live line working equipment and tools inspection before use, safe working policies, procedures and practices when using/operating specialised equipment and tools, methods of using specialised equipment, work team communication, use of safety observers, emergency response and rescue including First Aid etc.
- Policies and procedures dealing with general work practices for both glove and barrier/ hotstick combined, - definitions of terms used, responsibilities of personnel, types of structures from which glove and barrier methods can be performed, types of equipment and their compliance with relevant standards.
- Relationship between combined glove and barrier and stick methods - conditions under which they can be practiced.
- Techniques for installing and/or replacing HV insulators using glove and barrier/hotstick combined - intermediate insulators, angle insulators, bridging insulators, strain insulators and suspension insulators
- Techniques for erecting and/or replacing HV cross-arms using glove and barrier/hotstick combined - intermediate and angle
- Techniques for connecting and/or disconnecting HV bridges connections using glove and barrier/hotstick combined - strain/“Tee” bridges, bypass bridges/connections, HV A. B. C, HV and similar/dissimilar metals
- Techniques in the installation and/or maintenance of electrical equipment using

REQUIRED SKILLS AND KNOWLEDGE

hotstick - air break switches, gas switches, fuse assemblies, isolators, bird covers, surge diverters and fault indicators

- Techniques in the erection and/or replacement of poles - intermediate/suspension, angle, strain and termination
- Techniques in repairing and/or replacing HV armour rods and/or line guards and/or conversion methods of intermediate construction to strain in construction
- Techniques in the repairing and replacing HV conductors/cables and the identification of equipment used
- Techniques in installing and/or maintaining switching devices using glove and barrier.

T3 Plant, equipment and tools used for HV live line work encompassing:

- Commonwealth/State/Territory legislation, Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with plant, equipment and tools used for HV live line work.
- Safety precautions when working on plant, equipment and tools using hotstick combined - safe working clearances, Occupational Health and Safety hazards and precautions, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment, authorisation to work systems.
- Identification of plant, equipment and tools used for HV live line work – types, applications, construction, characteristics, limitations, safe working load.
- Serviceability of plant, equipment and tools used for HV live line work - inspection procedures, testing procedures, maintenance procedures, storage procedures.
- Relationship of live line work access authority/permit, disabling auto-reclose function and ensuring correct functioning of fault current protective devices prior to live line work.
- Live line access authorities, disabling auto-reclose function and ensuring fault current protective devices prior to live line work.
- Conductor supports – methods, types of equipment, construction, characteristics, limitations.
- Techniques in selecting appropriate conductor support method in accordance with requirements.
- Calculation of loads and wind loading on conductors.
- Effects of resultant forces when transferring conductor loads.
- Rigging procedures for conductor support equipment.

T4 Principles of high voltage encompassing:

- Commonwealth/State/Territory legislation, Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with working on or near High Voltage
- Electrical and electrostatic principles related to high voltage lines - relationship of

REQUIRED SKILLS AND KNOWLEDGE

current, voltage and resistance as related to transmission lines, relationship of phase voltage and respective line voltages.

- Production of an electric field – units, effect of distance, potential of an object within the field and the effect of distances to the potential.
- HV insulators - construction of a disc insulator, construction of a polymeric insulator, effects of an electrical field on disc insulators, identification of the number of disc insulators needed for a single line voltage, performance of a failed disc insulator on the line and the system.
- Determining the minimum allowable number of discs per string for each line voltage in the system before bare-hand work is to proceed
- Techniques in detecting a failed disc in a string
- Techniques in using appropriate tools and equipment to test a string
- Methods of recording data
- Effects of electrostatic induction on the human body - relationship of the resistance of a human body to different levels of current and voltage, relationship of a human body to an electric field, effects of electrostatic induction on bare-hand work.
- Application of Faraday's cage - effects of a body, advantages, description of the Faraday's cage used by bare-hand live-line workers
- Safety precautions working on or near High Voltage electrical apparatus - safe approach distances from live line, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment, permit to work systems and isolation procedures.
- Types and function of specialised live working equipment
- Safe working policies, procedures and practices when using and operating specialised equipment
- Methods of using specialised equipment
- Emergency response and rescue including First Aid etc
- Effects of lighting and switching surges on performance off string insulators - health effects to workers.
- Methods used to alleviate surges on transmission lines
- Magnetic field - difference between magnetic fields and electrostatic fields, source of magnetic field, techniques in locating, measuring and analysing known sources of magnetic fields, reasons for monitoring magnetic field exposure, techniques used to monitor magnetic fields.

T5 High voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, network interconnectors source of possible backfeed
- Role of the HV switching operator

REQUIRED SKILLS AND KNOWLEDGE

- Operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- Types and categories of HV switchgear
- Application, function and operating capabilities of switchgear
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV transmission main and working earths
- Earthing HV electrical apparatus practices and procedures for access - purposes of “Operational” and additional work part “on-site” earths, factors determining the location and effectiveness of “Operational” earthing, acceptable industry procedures, personal protective equipment, high voltage switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T6 High voltage fault switching principles encompassing:

- Primary causes, effects and types of HV electrical faults.
- HV protection devices - main components, types, categories, applications, functions.
- Basic principle of operation of HV system protection devices
- Protection co-ordination and protection “zoning”
- HV feeder auto-reclosing suppression – function, application.
- Circuit condition requirements and switching considerations when paralleling and separating HV feeders.

T7 High voltage distribution transformer principles encompassing:

- Operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer — cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution transformer and associated electrical apparatus faults.
- HV underground switching equipment - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers.

T8 High voltage SWER system encompassing:

- Application and function of SWER system components
- Circuit arrangement
- Principle of operation
- Hazards and procedures associated with faulty SWER earth systems

REQUIRED SKILLS AND KNOWLEDGE

- Procedure to isolate, energise and commission SWER substations

T9 Feeder automation system encompassing:

- Function of feeder automation system and the main components
- Operation procedure for a remote field device from a local control station
- Functions of “System Control and Data Acquisition” (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components
- SCADA system security interlocks and access restrictions
- SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciated System and Local Control Station
- Function of the main components of a local/remote control system
- Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciated System and Local Control Station.

T10 Safe working on energised HV AC and/or DC traction equipment encompassing:

- Commonwealth/State/Territory/local government legislation, Standards, codes, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on energised LV DC Traction overhead conductors and cables - live line minimum approach distances, Occupational Health and Safety hazards and precautions, identification of hazards, assessing and controlling risks, types, selection, maintenance and uses of personnel protective equipment, live line permit system, disabling auto-reclosing function, ensuring functioning of fault current protective devices, checking integrity of insulation prior to work commencement, types and function of specialised live line working equipment and tools inspection before use, safe working practices when using specialised equipment and tools, methods of using specialised equipment, work team communication, use of safety observers, emergency response and rescue including First Aid etc.
- Techniques in the use of hotsticks for the maintenance of energised traction overhead apparatus
- Techniques in the use of glove and barrier on energised traction overhead apparatus.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least one of the following:	Elevating work platform Insulated ladder Insulated mobile platform
B	At least two of the following:	Specialised tools Insulated gloves and barriers Tensioning equipment Geometry profiling equipment.
C	At least two of the following:	Air-break switches Insulators Surge arrestors Hardware and fittings
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of energised traction overhead electrical apparatus (glove).

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRDP1 Maintain overhead energised low voltage
2A conductors and cables

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of energised traction overhead electrical apparatus by the adoption of live line gloves and barrier techniques, without the need to interrupt traction power supply during the course of work undertaking. Competency shall be demonstrated in relation to the maintenance, visual inspection and pre-commissioning tests of the overhead traction electrical equipment and components as well as associated hardware including ancillary equipment.

Maintenance may include the carrying out of diagnostics and tests on conductors, equipment, systems as well as the removal, repair and replacement of cables, conductors, and associated hardware and returning such to operational service.

Types of traction wire support structures may consist of portals, pull-off, drop-pieces, head spans, and cross spans.

Types of traction components may include switches, surge arresters, insulators, droppers, bay components, cantilever hardware, portal hardware, steady spans hardware, steady spans, insulators, pull-off arms, tension regulators, section insulators, neutral sections, air break switches, in span feeders, isolation switches, knuckles (insulated and non-insulated) and cross arms.

Traction system components may consist of metalwork, wires, hardware, fittings and insulators.

Types of conductor may include HD, CAD, and Tin Bearing copper, aluminium, steel, aluminium conductor steel reinforced, copper cover steel.

Types of wiring arrangements include single wire systems, simple and compound catenary systems.

Plant may include live-line tools, insulated ladders, insulated elevating work platforms/vehicles/trains, specialist tension string equipment, wire drums.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space

RANGE STATEMENT

- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Rail Traction Units

UETDRRT34A Install and maintain traction network wiring systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of overhead traction wiring systems to ensure proper installation, in particular the correct registration of the contact wire with respect to the current collectors. It includes the undertaking of safe working practices on or about the running line/track and the preparation needed for stringing and profiling including the isolation of systems and circuits for safe working according to work plans, the diagnosis of faults and the modification and re-adjustment to appropriate standards. It may also encompass the correct positioning of road signs, barriers and or warning devices, and the procedure of issuing/accepting electrical permits. It also includes the visual and other necessary checks to confirm that equipment and associated hardware have been correctly installed according to design and are in a safe condition to undertake pre-commissioning tests prior to, putting into service, and updating of, installation and maintenance data such as as-built drawings and relevant quality assurance documentation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits

Prerequisite Unit(s)	4)	
	UEENEEE105A	Fix and secure electrotechnology equipment
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and

Prerequisite Unit(s)	4)	
		circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRI67A	Solve problems in energy supply network equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare/plan to install and maintain traction network wiring systems	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the installation and maintenance of traction network wiring systems are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working</p>

ELEMENT	PERFORMANCE CRITERIA
	order.
	1.8 Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue procedures and related work procedures according to requirements.
	1.9 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.12 Rail/Road signs, barriers and warning devices are positioned in accordance with requirements.
	1.13 Environmental constraints applicable to work are identified and control measures applied
2 Carry out the installation and maintenance of traction network wiring systems	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.
	2.4 Essential knowledge and associated skills are applied in the safe installation and maintenance of traction network wiring systems to ensure

ELEMENT**PERFORMANCE CRITERIA**

- completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.5 Overhead traction wiring systems, including cables, fittings, traction conductors and associated equipment are installed according to design and work schedule requirements and established procedures.
- 2.6 Maintenance, including repair and/or replacement of overhead traction wiring systems, including the modification and re-adjustment of overhead traction conductors is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.7 Profiling completed according to established procedures.
- 2.8 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.9 Unplanned events in the installation and maintenance of traction network wiring systems are undertaken within the scope of established procedures.
- 2.10 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.11 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3. Complete the installation and maintenance of traction network wiring systems
- 3.1 Work undertaken is checked against design drawings and works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
- 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.

ELEMENT**PERFORMANCE CRITERIA**

- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, the overhead traction network wiring system is returned to service in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of installing overhead traction wiring systems has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT34A Electrical Rail Traction Wiring Systems Installation

Evidence shall show an understanding of electrical rail traction wiring systems installation to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to the electrical traction.

T2 Electrical traction voltage and current circuit paths encompassing:

- Transmission distribution voltages
- Traction supply system and voltages
- Return and stay current paths, including electrolysis

T3 Relationship of sectioning, section insulator and overlaps/air gaps in a traction power system.

T4 Traction power system components encompassing:

- Function of transformer/rectifiers
- Configuration and purpose of traction overhead wiring systems
- Function of isolators/switches
- Function of the circuit breaker

T5 Reliability and security of traction supply

T6 Traction power system electrical protection encompassing:

- Load protection
- Surge protection
- Fault protection
- Electrolytic protection

T7 Impact of electromagnetic forces encompassing:

- Telephone interference
- Effects of television/radio interference

T8 Insulation methods in a traction power system encompassing:

- Types of electrical insulation
- Insulation coordination
- Reason for electrical clearances

REQUIRED SKILLS AND KNOWLEDGE

T9 Bonding systems - structure bonds, traction bonds/bonding cables and impedance bonds

T10 Ancillary conductors - feeder wires, current return path and other ancillary conductors

T11 Relationship of current and potential drapers/jumpers to the traction power system

T12 Electrical wiring system components - earth wires, feeder wire, return conductor, insulators, catenary wire, contact/trolley wire, droppers, tensioning equipment, current collectors, tram support networks, tram fittings, bridge/tunnel fittings

T13 Electrical traction circuits encompassing:

- Types
- Applications

T14 Relationship of the components, apparatus and the conductors to the operation of the traction system

T15 Effective current collection and wire interface

T16 Effective registration in the traction power system

T17 Profiling overhead traction wire methods.

- Factors that impact on current collectors
- Methods to achieving smooth current collector transitions and interfaces

T18 Dynamic and static forces encompassing:

- Types that effect traction systems
- Effects on effective registration
- Techniques to minimise the adverse effects

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Install and maintain at least four of the following:	Support structure, Span, Section insulator, Neutral section, Midpoint anchor, Support equipment, Tension regulators, Stay/guy wire, Tramway support network
B	With regards to "A" incorporate at least two of the following:	Catenary, Dropper, Contact/trolley*, Feeder, Earth conductor, Drape/potential jumper (*must do)
C	With regards to "A" incorporate at least one of the following:	Elevating work platform, Ladder, Mobile platform
D	With regards to "A" incorporate at least two of the following:	Tensioning equipment*, Specialised tools, Ropes, Geometry profiling equipment. (*must do)
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate

		solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of traction network wiring systems.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of traction network wiring systems as it relates to the correct registration of the contact wire with respect to the current collectors

Types of conductor may include HD, CAD, tin bearing and magnesium copper, aluminium, steel, aluminium conductor steel reinforced (ACSR), insulated screened and unscreened cable and pilot and control cables.

Materials and equipment may include porcelain, glass, ceramic, fibre glass and composite insulators, steel, brass, stainless steel, neoprene, copper, cast and galvanized fittings, drums, pulleys, hooks, yoke plate, line grips, tensioning devices, ropes, slings, hydraulic/manual crimping and cutting tools, specialized tools and dynamometers; Conductors and support wires include droppers wire, catenary wire, contact/trolley wire, earth wire, feeder wire, drape/potential jumper wire, stay wire, cross-span, networks and head span wire.

Associated equipment to conductors may include registration arms, midpoint anchors, section insulators, neutral sections, supports, cantilevers, portals, drop verticals, surge diverters and tensioning devices.

Maintenance may include the removal, repair and replacement of cables, conductors and associated hardware.

Conductors and support wires include droppers wire, catenary wire, contact/trolley wire, earth wire, feeder wire, drape/potential jumper wire, stay wire, cross-span, networks and head span wire.

Associated equipment to conductors may include registration arms, midpoint anchors, section insulators, neutral sections, supports, cantilevers, portals, drop verticals, surge diverters and tensioning devices.

Plant may include ladders, elevating work platform, winches and capstans, specialist tensioning stringing equipment, cable trailers and drum stands, rail and road rail mounted overhead wiring vehicles.

Installing tension regulators encompasses fitting, positioning and securing weight chains and pulley systems.

Permits may include access permits, permits to work and or other relevant permits and documents by recognised bodies.

Profiling encompasses sag, tension, encumbrances, offsets, cants and registration which involves horizontal and vertical calibration of the contact wire or trolley wire to a design height and stagger in reference to the running rail.

Current collectors may include pantographs and tram trolley poles.

The following constants and variables included in the element/Performance Criteria in

RANGE STATEMENT

this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Rail Traction Units

UETDRRT35A Install and maintain traction network equipment and components

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of the overhead traction electrical equipment and components as well as associated hardware including ancillary equipment. It includes the repair or replacement of “like for like” electrical components/equipment and associated hardware and the undertaking of safe working practices on or about the running line/track. It also encompasses the isolation of systems and circuits for safe working according to work plans and the correct positioning of road signs, barriers and or warning devices and the procedure of issuing/accepting electrical permits. It also includes the visual inspection and necessary checks to confirm that equipment, components and associated hardware have been correctly installed according to design and are in a safe condition to test prior to putting to service, the undertaking of pre-commissioning tests as required to ensure the integrity of the traction system prior to putting back into service and the updating of installation data and relevant quality assurance documentation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits

Prerequisite Unit(s)	4)	
	UEENEEE105A	Fix and secure electrotechnology equipment
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and

Prerequisite Unit(s)	4)	
		circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRIS67A	Solve problems in energy supply network equipment
	UETTDRT34A	Install and maintain traction network wiring systems

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the

Employability Skills

5)

qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare for the installation and maintenance of traction network equipment/components	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.3	OHS policies and procedures related to requirements and established procedures for the installation and maintenance of overhead traction equipment/components are obtained and confirmed for the purposes of the work to be performed and communicated.
		1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
		1.5	Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
		1.6	Relevant work permits are obtained to access and perform work according to requirements and/or

ELEMENT

PERFORMANCE CRITERIA

- established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
 - 1.8 Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue procedures according to requirements.
 - 1.9 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
 - 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
 - 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
 - 1.12 Rail/road signs, barriers and warning devices are positioned in accordance with requirements.
 - 1.13 Environmental constraints applicable to work are identified and control measures applied.
- 2 Carry out the installation and maintenance of traction network equipment/components
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
 - 2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
 - 2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.

ELEMENT

PERFORMANCE CRITERIA

- | | |
|------|---|
| 2.4 | Essential knowledge and associated skills are applied in the safe installation of overhead traction equipment/components to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements. |
| 2.5 | Electrical components/equipment and associated hardware are positioned, secured and terminated/connected in accordance with requirements and established procedures. |
| 2.6 | Electrical component/equipment and associated hardware is ascertained as operating within normal operating parameters and in accordance with requirements and established procedures. |
| 2.7 | Maintenance, including repair and/or replacement of overhead traction equipment/components is carried out, in accordance with the work schedule and requirements/established procedures. |
| 2.8 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| 2.9 | Unplanned events during the installation of overhead traction equipment/components are undertaken within the scope of established procedures. |
| 2.10 | Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills. |
| 2.11 | Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures |
| 3 | Complete the installation and maintenance of traction network equipment/components |
| 3.1 | Work undertaken is checked against design drawings and works schedule for conformance with requirements and anomalies reported in accordance with established procedures. |
| 3.2 | Work site is rehabilitated, cleaned up and made safe in accordance with established procedures. |

ELEMENT

PERFORMANCE CRITERIA

- 3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.4 Relevant work permit(s) are signed off after final inspections and the system is energised, tested and returned to service in accordance with requirements.
- 3.5 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of installing overhead traction equipment and components has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT35A Electrical Rail Traction Equipment Installation

Evidence shall show an understanding of electrical rail traction equipment installation to an extent indicated by the following aspects:

T1 Overhead traction equipment encompassing:

- Types - switches/isolators, fuse switches, links, section insulators, and fuses
- Purpose

T2 Types of overhead traction components encompassing:

- Types - cantilever hardware, droppers, bay components, portal hardware, head span hardware, section insulators, neutral sections, registration fittings, steady span, tension regulators, and cross spans
- Purposes

T3 Types of conductors used for overhead wiring such as hard-drawn, CAD, and tin-bearing copper, aluminium, steel, and other alloyed conductors

T4 Types of traction wire support structures that may consist of portals, cantilevers, drop pieces, head spans, cross spans and pull-offs

T5 Ancillary equipment

- Types - surge arresters, booster and auxiliary transformers
- Purpose

T6 Methods for installing/replacing conductors that may consist the use of:

- Preformed fittings
- Compression fittings
- Wedged fittings
- Bolted splices
- Lugs
- Bolted clamps

T7 Methods for installing/replacing components such as:

- Feeders
- Droppers
- Dissimilar conductors
- Jumpers

REQUIRED SKILLS AND KNOWLEDGE

- Surge arresters

T8 Use of plant and equipment for installation/maintenance work, such as:

- Elevating work platforms
- Ladders
- Works trains
- Rail-mounted overhead wiring equipment/vehicles
- Road/rail height access machinery/vehicles
- Voltage detectors
- Micrometer/gauges
- Tension wrenches
- Dynamometers
- Other specialised tools

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an

extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and

- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Install and maintain traction network equipment and components and incorporate at least two of the following:	Fuse switches Dropout fuses Section insulators Switches/isolators Links Fuses Surge diverters Transformers
B	With regards to "A" incorporate at least five of the following:	Cantilever hardware Head span Neutral sections Pull offs Registration fittings Steady span Tension regulators Cross spans Tramway support network Pendulum

C	With regards to "A" incorporate at least two of the following:	Preformed fittings Compression fittings Wedge fittings Bolted splices
D	With regards to "A" incorporate at least three of the following:	Feeders Dissimilar conductors Lugs Bolted clamp Drapes/potential jumper Droppers
E	With regards to the above incorporate at least two of the following:	Voltage detectors Micrometer/gauge Tension wrench Dynamometer Specialised tools
F	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of traction

network equipment and components.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no recommended concurrencies for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation, visual inspection and pre-commissioning tests of the overhead traction electrical equipment and components as well as associated hardware including ancillary equipment.

Installation includes but is not limited to fitting, setting up and putting in place conductors, equipment, systems and conducting tests for operational soundness.

Types of traction wire support structures may consist of portals, pull-off, drop-pieces, head spans, cross spans and tramway support networks.

Types of traction components may include droppers, bay components, cantilever hardware, portal hardware, steady spans hardware, steady spans, insulators, pull-off, tension regulators, section insulators, neutral sections, tramway frogs, pendulums, crossing pans and ears/hangers, booster and auxiliary transformers, air break switches, in-span feeders, isolation switches knuckles (insulated and non-insulated), cross arms.

Traction system components may consist of metalwork, wires, hardware, fittings and insulators.

Types of conductor may include HD, CAD and tin bearing copper, aluminium, steel, aluminium conductor steel reinforced, copper cover steel.

Types of wiring arrangements include single wire/tram systems, simple and compound catenary systems.

Plant may include ladders, elevating work platforms, winches, specialist tension string equipment, cable trailers, work trains, rail mounted overhead wiring equipment/vehicles and road rail mounted overhead wiring equipment/vehicles.

Ancillary equipment may include, transformers, switches, and surge diverters.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of

RANGE STATEMENT

- information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Rail Traction Units

UETDRRT36A Maintain traction network wiring systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of overhead traction wiring systems to ensure their proper operation, in particular the correct registration of the contact wire with respect to the current collectors. It includes the undertaking of safe working practices on or about the running line/track and the preparation needed for stringing and profiling including the isolation of systems and circuits for safe working according to work plans, the diagnosis of faults and the modification and re-adjustment to appropriate standards. It may also encompass the correct positioning of road signs, barriers and or warning devices, and the procedure of issuing/accepting electrical permits. It also includes the visual and other necessary checks to confirm that equipment and associated hardware have been correctly maintained according to design and are in a safe condition to undertake tests prior to, putting into service, and updating of maintenance data such as as-built drawings and relevant quality assurance documentation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment

Prerequisite Unit(s)	4)	
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDREL16A	Working safely near live electrical apparatus
	UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management

Prerequisite Unit(s) 4)

policies and procedures

UETDRIS67A Solve problems in energy supply network equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to maintain traction network wiring systems	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the maintenance of traction network wiring systems are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p> <p>1.8 Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue procedures and related work procedures according to requirements.</p> <p>1.9 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.</p> <p>1.10 Site is prepared according to the work schedule</p>

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the maintenance of traction network wiring systems	<p>and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.</p> <p>1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.</p> <p>1.12 Rail/Road signs, barriers and warning devices are positioned in accordance with requirements.</p> <p>1.13 Environmental constraints applicable to work are identified and control measures applied</p> <p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.</p> <p>2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.</p> <p>2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.</p> <p>2.4 Essential knowledge and associated skills are applied in the safe maintenance of traction network wiring systems to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.5 Maintenance, including repair and/or replacement of overhead traction wiring systems, including the modification and re-adjustment of overhead traction conductors is carried out, in accordance with the work schedule and requirements/established procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
	2.6 Profiling completed according to established procedures.
	2.7 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.8 Unplanned events in the maintenance of traction network wiring systems are undertaken within the scope of established procedures.
	2.9 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.10 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the maintenance of traction network wiring systems	3.1 Work undertaken is checked against design drawings and works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, the overhead traction network wiring system is returned to service in accordance with requirements.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of maintaining overhead traction wiring systems has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT36A Electrical Rail Traction Wiring Systems Maintenance

Evidence shall show an understanding of electrical rail traction wiring systems maintenance to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to the electrical traction

T2 Electrical traction voltage and current circuit paths encompassing:

- Transmission distribution voltages
- Traction supply system and voltages
- Return and stay current paths, including electrolysis

T3 Relationship of sectioning, section insulator and overlaps/air gaps in a traction power system

T4 Traction power system components encompassing:

- Function of transformer/rectifiers
- Configuration and purpose of traction overhead wiring systems
- Function of isolators/switches
- Function of the circuit breaker
- Reliability and security of traction supply

T5 Traction power system electrical protection encompassing:

- Load protection
- Surge protection
- Fault protection
- Electrolytic protection

T6 Impact of electromagnetic forces encompassing:

- Telephone interference
- Effects of television/radio interference

T7 Insulation methods in a traction power system encompassing:

- Types of electrical insulation
- Insulation coordination
- Reason for electrical clearances

REQUIRED SKILLS AND KNOWLEDGE

T8 Bonding systems - structure bonds, traction bonds/bonding cables and impedance bonds

T9 Ancillary conductors - feeder wires, current return path and other ancillary conductors

- Relationship of current and potential droppers/jumpers to the traction power system
- Methods to achieving smooth current collector transitions and interfaces

T10 Dynamic and static forces encompassing:

- Types that effect traction systems
- Effects on effective registration
- Techniques to minimise the adverse effects

T11 Overhead traction equipment encompassing:

- Types - switches/isolators, fuse switches, links, section insulators, and fuses
- Purpose

T12 Types of overhead traction components encompassing:

- Types - cantilever hardware, droppers, bay components, portal hardware, head span hardware, section insulators, neutral sections, registration fittings, steady span, tension regulators, and cross spans
- Purposes

T13 Types of conductors used for overhead wiring such as hard-drawn, CAD, and tin-bearing copper, aluminium, steel, and other alloyed conductors

T14 Types of traction wire support structures that may consist of portals, cantilevers, drop pieces, head spans, cross spans and pull-offs

T15 Ancillary equipment

- Types - surge arresters, booster and auxiliary transformers
- Purpose

T16 Methods for replacing conductors that may consist the use of:

- Preformed fittings
- Compression fittings
- Wedged fittings
- Bolted splices
- Lugs
- Bolted clamps

T17 Methods for replacing components such as:

- Feeders
- Droppers
- Dissimilar conductors
- Jumpers

REQUIRED SKILLS AND KNOWLEDGE

- Surge arresters

T18 Use of plant and equipment for maintenance work, such as:

- Elevating work platforms
- Ladders
- Works trains
- Rail-mounted overhead wiring equipment/vehicles
- Road/rail height access machinery/vehicles
- Voltage detectors
- Micrometer/gauges
- Tension wrenches
- Dynamometers
- Other specialised tools

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an

extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and

- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Maintain at least four of the following:	Support structure, Span, Section insulator, Neutral section, Midpoint anchor, Support equipment, Tension regulators, Stay/guy wire, Tramway support network
B	With regards to "A" incorporate at least two of the following:	Catenary, Dropper, Contact/trolley*, Feeder, Earth conductor, Drape/potential jumper (*must do)
C	With regards to "A" incorporate at least	Elevating work platform,

	one of the following:	Ladder, Mobile platform
D	With regards to "A" incorporate at least two of the following:	Tensioning equipment*, Specialised tools, Ropes, Geometry profiling equipment. (*must do)
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of traction network wiring systems.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment**9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units**9.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRRT37A	Maintain traction network equipment and components
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Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of traction network wiring systems as it relates to the correct registration of the contact wire with respect to the current collectors

Types of conductor may include HD, CAD, tin bearing and magnesium copper, aluminium, steel, aluminium conductor steel reinforced (ACSR), insulated screened and unscreened cable and pilot and control cables.

Materials and equipment may include porcelain, glass, ceramic, fibre glass and composite insulators, steel, brass, stainless steel, neoprene, copper, cast and galvanized fittings, drums, pulleys, hooks, yoke plate, line grips, tensioning devices, ropes, slings, hydraulic/manual crimping and cutting tools, specialized tools and dynamometers; Conductors and support wires include droppers wire, catenary wire, contact/trolley wire, earth wire, feeder wire, drape/potential jumper wire, stay wire, cross-span, networks and head span wire.

Associated equipment to conductors may include registration arms, midpoint anchors, section insulators, neutral sections, supports, cantilevers, portals, drop verticals, surge diverters and tensioning devices.

Maintenance may include the removal, repair and replacement of cables, conductors and associated hardware.

Conductors and support wires include droppers wire, catenary wire, contact/trolley wire, earth wire, feeder wire, drape/potential jumper wire, stay wire, cross-span, networks and head span wire.

Associated equipment to conductors may include registration arms, midpoint anchors, section insulators, neutral sections, supports, cantilevers, portals, drop verticals, surge diverters and tensioning devices.

Plant may include ladders, elevating work platform, winches and capstans, specialist tensioning stringing equipment, cable trailers and drum stands, rail and road rail mounted overhead wiring vehicles.

Installing tension regulators encompasses fitting, positioning and securing weight chains and pulley systems.

Permits may include access permits, permits to work and or other relevant permits and documents by recognised bodies.

Profiling encompasses sag, tension, encumbrances, offsets, cants and registration which involves horizontal and vertical calibration of the contact wire or trolley wire to a design height and stagger in reference to the running rail.

Current collectors may include pantographs and tram trolley poles.

The following constants and variables included in the element/Performance Criteria in

RANGE STATEMENT

this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Rail Traction Units

UETDRRT37A Maintain traction network equipment and components

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of the overhead traction electrical equipment and components as well as associated hardware including ancillary equipment. It includes the repair or replacement of "like for like" electrical components/equipment and associated hardware and the undertaking of safe working practices on or about the running line/track. It also encompasses the isolation of systems and circuits for safe working according to work plans and the correct positioning of road signs, barriers and or warning devices and the procedure of issuing/accepting electrical permits. It also includes the visual inspection and necessary checks to confirm that equipment, components and associated hardware are in a safe condition to test prior to putting to service, the undertaking of tests as required to ensure the integrity of the traction system prior to putting back into service and the updating of maintenance data and relevant quality assurance documentation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment

Prerequisite Unit(s)	4)	
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDREL16A	Working safely near live electrical apparatus
	UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management

Prerequisite Unit(s) 4)

policies and procedures

UETDRIS67A Solve problems in energy supply network equipment

UETDRRT36A Maintain traction network wiring systems

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the maintenance of traction network equipment and components	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the maintenance of overhead traction equipment/components are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified; OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p> <p>1.8 Relevant personnel at worksite are confirmed current in CPR, First Aid, and other rescue procedures according to requirements.</p> <p>1.9 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.</p> <p>1.10 Site is prepared according to the work schedule</p>

ELEMENT**PERFORMANCE CRITERIA**

- and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Rail/road signs, barriers and warning devices are positioned in accordance with requirements.
- 1.13 Environmental constraints applicable to work are identified and control measures applied.
- 2 Carry out the maintenance of traction network equipment and components
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
- 2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures.
- 2.4 Essential knowledge and associated skills are applied in the safe maintenance of overhead traction equipment/components to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.5 Maintenance, including repair and/or replacement of overhead traction equipment/components is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.6 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.

ELEMENT**PERFORMANCE CRITERIA**

- | | | | |
|---|---|-----|---|
| 3 | Complete the maintenance of traction network equipment and components | 2.7 | Unplanned events during the maintenance of overhead traction equipment/components are undertaken within the scope of established procedures. |
| | | 2.8 | Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills. |
| | | 2.9 | Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures |
| | | 3.1 | Work undertaken is checked against design drawings and works schedule for conformance with requirements and anomalies reported in accordance with established procedures. |
| | | 3.2 | Work site is rehabilitated, cleaned up and made safe in accordance with established procedures. |
| | | 3.3 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
| | | 3.4 | Relevant work permit(s) are signed off after final inspections and the system is energised, tested and returned to service in accordance with requirements. |
| | | 3.5 | Works completion records, reports, modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of maintaining overhead traction equipment and components has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT37A Electrical Rail Traction Equipment Maintenance

Evidence shall show an understanding of electrical rail traction equipment maintenance to an extent indicated by the following aspects:

T1 Overhead traction equipment encompassing:

- Types - switches/isolators, fuse switches, links, section insulators, and fuses
- Purpose

T2 Types of overhead traction components encompassing:

- Types - cantilever hardware, droppers, bay components, portal hardware, head span hardware, section insulators, neutral sections, registration fittings, steady span, tension regulators, and cross spans
- Purposes

T3 Types of conductors used for overhead wiring such as hard-drawn, CAD, and tin-bearing copper, aluminium, steel, and other alloyed conductors

T4 Types of traction wire support structures that may consist of portals, cantilevers, drop pieces, head spans, cross spans and pull-offs

T5 Ancillary equipment

- Types - surge arresters, booster and auxiliary transformers
- Purpose

T6 Methods for replacing conductors that may consist the use of:

- Preformed fittings
- Compression fittings
- Wedged fittings
- Bolted splices
- Lugs
- Bolted clamps

T7 Methods for replacing components such as:

- Feeders
- Droppers
- Dissimilar conductors
- Jumpers

REQUIRED SKILLS AND KNOWLEDGE

- Surge arresters

T8 Use of plant and equipment for maintenance work, such as:

- Elevating work platforms
- Ladders
- Works trains
- Rail-mounted overhead wiring equipment/vehicles
- Road/rail height access machinery/vehicles
- Voltage detectors
- Micrometer/gauges
- Tension wrenches
- Dynamometers
- Other specialised tools

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an

extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and

- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Maintain traction network equipment and components and incorporate at least two of the following:	Fuse switches Dropout fuses Section insulators Switches/isolators Links Fuses Surge diverters Transformers
B	With regards to "A" incorporate at least five of the following:	Cantilever hardware Head span Neutral sections Pull offs Registration fittings Steady span Tension regulators Cross spans Tramway support network Pendulum

C	With regards to "A" incorporate at least two of the following:	Preformed fittings Compression fittings Wedge fittings Bolted splices
D	With regards to "A" incorporate at least three of the following:	Feeders Dissimilar conductors Lugs Bolted clamp Drapes/potential jumper Droppers
E	With regards to the above incorporate at least two of the following:	Voltage detectors Micrometer/gauge Tension wrench Dynamometer Specialised tools
F	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of traction network equipment

and components.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETDRRT3 Maintain traction network wiring systems
6A

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance, visual inspection and commissioning tests of the overhead traction electrical equipment and components as well as associated hardware including ancillary equipment.

Types of traction wire support structures may consist of portals, pull-off, drop-pieces, head spans, cross spans and tramway support networks.

Types of traction components may include droppers, bay components, cantilever hardware, portal hardware, steady spans hardware, steady spans, insulators, pull-off, tension regulators, section insulators, neutral sections, tramway frogs, pendulums, crossing pans and ears/hangers, booster and auxiliary transformers, air break switches, in-span feeders, isolation switches knuckles (insulated and non-insulated), cross arms.

Traction system components may consist of metalwork, wires, hardware, fittings and insulators.

Types of conductor may include HD, CAD and tin bearing copper, aluminium, steel, aluminium conductor steel reinforced, copper cover steel.

Types of wiring arrangements include single wire/tram systems, simple and compound catenary systems.

Plant may include ladders, elevating work platforms, winches, specialist tension string equipment, cable trailers, work trains, rail mounted overhead wiring equipment/vehicles and road rail mounted overhead wiring equipment/vehicles.

Ancillary equipment may include, transformers, switches, and surge diverters.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications

RANGE STATEMENT

- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Rail Traction Units

UETDRRT99A Test and verify rail traction installations

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers inspection and testing to verify whether a Rail Traction Installations is safe and complies with all requirements. It encompasses working safely, visual inspections and mandatory, optional and functional test procedures, identifying non-compliance defects and mandatory reporting requirements.

Application of the Unit

Application of the Unit 2)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit require a license to practice in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the access to High

License to practice**3)**

Voltage and Low Voltage distribution network installations, operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment.

2. Compliance may be required in various jurisdictions relating to currency in ESI Rescue Procedures, CPR/First Aid, confined space, lifting and risk safety measures.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits

Prerequisite Unit(s)	4)
	UEENEEG102A Solve problems in low voltage a.c. Circuits
	UETTDREL11A Apply sustainable energy and environmental procedures
	UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A Working safely near live electrical apparatus
	UETTDNIS52A Install and maintain poles, structures and associated hardware
	UETTDNIS54A Install and maintain poles, structures, overhead conductors and cables
	UETDRRT21A Install traction overhead wiring systems
	UETDRRT22A Maintain traction overhead wiring systems
	UETDRRT27A Install overhead traction components and equipment
	UETDRRT28A Maintain overhead traction components and equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”.

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare to visually inspect, test and verify rail traction installation.	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites
		1.3	OHS policies and procedures related to requirements and established procedures for accessing, testing and verification of Rail Traction installations are obtained and confirmed for the purposes of the work to be performed and communicated.
		1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
		1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented

ELEMENT**PERFORMANCE CRITERIA**

- and monitored including emergency exits kept clear according to established procedures
- 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
 - 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
 - 1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.
 - 1.9 Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
 - 1.10 Specialist test and measurement equipment for testing and verification of Rail Traction installations are obtained, inspected and confirmed in working order and calibrated as per requirements and established procedures
 - 1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
 - 1.12 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures
 - 1.13 Road signs, barriers and warning devices are positioned in accordance with requirements.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out visual inspection, test and verification of Rail Traction installation.	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.</p> <p>2.2 Lifting, climbing, working in confined spaces and aloft, use of power tools/equipment, test equipment, test and measurement equipment, techniques and practices are safely followed and, currency according to requirements confirmed.</p> <p>2.3 Essential knowledge and associated skills are applied in the inspection, safe access, testing and verification of Rail Traction installations to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.4 Rail Traction installations and associated hardware is visually inspected and confirmed as positioned, secured and terminated/connected in accordance with requirements and established procedures.</p> <p>2.5 Energised tests and/or measurements, if required, to verify Rail Traction installations is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.</p> <p>2.6 Rail Traction installations is checked for suitability and conformance with organisational construction standards and electrical rail traction network supply standards</p> <p>2.7 Rail Traction installation protection methods and devices are validated as meeting organisational construction and rail traction network protection standards.</p> <p>2.8 Rail Traction installation switchgear is validated as being appropriately rated and meeting functional requirements of organisational construction and distribution network protection standards</p>

ELEMENT	PERFORMANCE CRITERIA
2.9	Rail Traction installations earthing system and MEN system components are verified as correctly installed and conforming to organisational construction and distribution network standards.
2.10	Mandatory tests are conducted to verify that Rail Traction installation: Rail traction system phasing, phase rotation and polarity is correct and conform to network construction standards. Electrical rail traction network voltage levels comply with network supply standards.
2.11	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
2.12	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
2.13	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Report inspection and test findings.	<p>3.1 OHS risk control work completion measures and procedures are followed.</p> <p>3.2 Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies corrected/ reported in accordance with established procedures.</p> <p>3.3 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.</p> <p>3.4 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.</p> <p>3.5 Non-compliance defects are identified, corrected and/or reported in accordance with established procedures.</p>

ELEMENT**PERFORMANCE CRITERIA**

- 3.6 Recommendations for rectifying defects are made in accordance with established procedures.
- 3.7 Mandatory documentation is completed in accordance with established procedures.
- 3.8 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.9 Relevant work permit(s) are signed off and, electrical equipment (network infrastructure) are returned to service in accordance with requirements.
- 3.10 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge of inspecting rail traction structures and electrical apparatus has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TRT99A Test and verify rail traction installations

Evidence shall show an understanding of rail traction installations testing and verification to an extent indicated by the following aspects:

T1 Legislated regulations encompassing:

- legislation and regulations that require installations and equipment to be tested to ensure they are safe.
- the person/bodies responsible for the various aspects of ensuring rail traction installations are safe.
- results of tests that show an rail traction installation is safe for connection to the supply.
- results of periodic inspection and tests that show construction site wiring and equipment is safe to use.
- results of periodic inspection and tests that show the rail traction installations electrical equipment are safe to use.

T2 Testing installations encompassing:

- Rail traction system phasing, phase rotation and polarity is correct and conform to network construction standards.
- Electrical rail traction network voltage levels comply with network supply standards.
- Potential present upon rail traction network neutral conductors conform network supply standards.
- Insulation resistance is adequate
- Earthing system and MEN system components are verified as correctly installed

T3 Documentation encompassing:

- results of tests conducted on a rail traction installation in accordance with work package requirements and ensure the rail traction installation is safe.
- documents of periodic inspection and testing of rail traction installation and equipment in accordance with requirement.
- Non-compliances and defects reported in accordance with established procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships.

However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment

Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum	Item List

	number of items on which skill is to be demonstrated	
A	At least two of the following:	Visual* Infra-red camera X-Ray Camera Binoculars/telescope (* must do)
B	Any one of the following:	Pyramid Delta pi Enterprise specific type
C	At least three of the following	Insulators Clamps Bolts Conductor spacers Vibration dampers Structural components
D	At least one of the following	Copper Aluminium Steel Aluminium/steel reinforced
E	At least two of the following	Elevated work platform Portable platform Gondola Hook ladder* Elevated work box (*must do)
F	All of the following	Voltage/ de-energised indicating device Earthing conductors

G	All of the following	Reporting procedures Reporting outcomes
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Network constructions standards
- Network supply standards
- Suitable work environment, facilities, equipment and materials to undertake actual inspection of overhead structures and electrical apparatus.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working aloft (upon pole/structure or from EWP), below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation, inspection and maintenance of rail traction installations and includes

Rail traction network installations and associated hardware which may include relevant line/network high voltage overhead; conductors, groundwires, insulators, structural members, structural hardware, vibration dampers, conductor spacers, conductor repair.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the

Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Authorisation
- Confined space
- Pre-commissioning testing and measurement
- Documenting detail of work events, record keeping and or storage of information
- Drawings and specifications
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Quality assurance systems
- Network construction standards
- Network supply standards
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Distribution

UETTDRSB21A Diagnose and rectify faults in substation environment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This Competency Standard Unit covers the identification and analysis of fault conditions including the isolation, repair and restoration of substation control circuits.

Application of the Unit

Application of the Unit **2)**

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of

License to practice 3)
operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits

Prerequisite Unit(s)	4)	
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	Pathway 1 - Electrician	
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	Pathway 2 – Electrical Fitter	
	UEENEEG199A	Conduct compliance and functional verification of electrical apparatus and existing circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Prepare/plan for fault finding and rectification in power system substation environment	1.1	Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.

ELEMENT	PERFORMANCE CRITERIA
1.3	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
1.4	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.
1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.
1.6	Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.
1.7	Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.
1.8	Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.
1.9	Work site is prepared according to the work schedule and to minimise OHS risk and damage to property and personnel in accordance with established procedures.
2 Carry out fault finding within the substation environment	2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with requirements and/or established procedures.
	2.2 CPR, Rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established

ELEMENT**PERFORMANCE CRITERIA**

- procedures.
- 2.3 Safe working documentation is acquired and requirements completed in accordance with established procedures.
- 2.4 Lifting, climbing and working aloft, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.
- 2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions/preventative action taken according to established procedures.
- 2.6 Essential knowledge and associated skills are applied for the safe diagnose and rectification of faults in power system substation to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.7 Faults are located, identified and affected circuits isolated in accordance with the work schedule and requirements and/or established procedures.
- 2.8 Faults in power system substation control circuits are rectified in an agreed timeframe and to established quality standards with a minimum of waste.
- 2.9 Faults are diagnosed, analysed and recommendations made to prevent a reoccurrence.
- 2.10 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
- 2.11 Circuit functions are restored in accordance with work schedule requirements and/or established procedures.
- 2.12 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality

ELEMENT**PERFORMANCE CRITERIA**

ELEMENT	PERFORMANCE CRITERIA
	outcome is achieved for the client/customer and to a community/industry standard.
3 Complete fault finding within the substation environment	3.1 Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Safe working documentation is surrendered and equipment made ready for service.
	3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Required works completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of diagnosing and rectifying faults in secondary systems substation environment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB21A Substation faults finding

Evidence shall show an understanding of substation faults finding to an extent indicated by the following aspects:

T1 Safe working on energised low voltage equipment encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on or near energised low voltage conductors - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment
- Work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, release and rescue procedures for work on or near exposed energised LV conductors.

T2 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T3 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures

REQUIRED SKILLS AND KNOWLEDGE

- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T4 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

T5 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans,
- Processes of updating switching diagrams

T6 Enterprises specific specialised tools encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers, phase rotation)
- Characteristics, capabilities and application of specialised tools for a particular job
- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
- Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
- Techniques in pre-use inspection on the serviceability of specialised tools
- Techniques in the selection, use, maintenance, and care and storage of specialised tools
- Identifying OHS hazards, assessing and controlling risks associated with their use
- Techniques for the safe use of specialised power tools.

REQUIRED SKILLS AND KNOWLEDGE

T7 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms
- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T8 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure.

T9 Fault conditions and symptoms related to the plant and/or equipment type encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to typical fault conditions and systems
- Interpretation of faults in operating mechanisms which may include drive trains and mechanical power drives, stored energy systems including hydraulic systems, pneumatic systems and mechanical storage systems, accumulators
- Interpretation of faults in electrical control systems which may include electro-mechanical relay systems, micro-processor based systems, PLC systems, integrated control systems or combinations of electrical/mechanical systems
- Types of electrical systems including AC, DC and combinations of both
- Types of fault conditions - failure to operate, failure in service and include the appropriate procedures for work on in service plant/equipment
- Types of symptoms - alarms, relay flags, mechanical defects, insulation

REQUIRED SKILLS AND KNOWLEDGE

deterioration, leaks, over-pressure, under pressure, out of tolerance measurements and checks.

T10 Substation equipment components and materials related to the plant and/or equipment type encompassing:

- Types of components - complete unit of plant and/or equipment, replacement components or appropriate substitutes, their dimensions, suitability and serviceability; also the components associated with the local control systems of the equipment including indication of levels, quantities, volumes, pressures and temperatures and the operating principles of these devices and components
- Types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
- Techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present an OHS hazard to persons in the workplace

T11 Substation safety practices encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to substation safety practices
- Techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
- Requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from energised conductors
- Requirements for climbing and working at heights in substations - attached climbing principles, selection, use and operation of elevated work platforms and any OHS requirements associated with the use of EWPs
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
- Control of oil spills - identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
- Rescue and release procedures - the rescue personnel from energised conductors, emergency descent from an EWP and may include rescue from confined spaces.
- Enterprise requirements - safe access and Authorisation to Work procedures, use of mobile extendable equipment on or near energised HV conductors, emergency response procedures.
- Hazards associated with work in substations including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, dangers of near approach to energised conductors

REQUIRED SKILLS AND KNOWLEDGE

T12 Design principles of Substation LV AC and DC supply systems encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Wiring conventions, systems and labelling conventions
- Substation equipment identification and layout, wiring and schematic diagrams and other appropriate diagrammatic representations
- LV design specifications, supply requirements, electrical load assessments
- Substation LV system distribution requirements - substation batteries, isolation requirements, paralleling requirements, battery chargers, DC distribution panels and control systems, AC distribution panels and control systems, auto change-over requirements,
- Control equipment and auxiliary relays, flags and alarms,
- Common panel layouts.

T13 Low voltage substation switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to low voltage substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment
- Role and responsibilities of the LV switching operator
- Operational forms, access authorities and permits associated with LV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits
- Use, care and operation of equipment associated with LV substation switching
- LV switchgear – types, categories, application, operating capabilities
- Operation of LV substation switching or indicating devices
- Operation of protection systems and substation equipment
- Restrictions pertaining to LV switching equipment
- Earthing LV electrical apparatus practices and procedures for access
- Low voltage switching techniques
- Restrictions pertaining to Enterprise Specific procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least two of the following:	HV circuit breaker control system fault Transformer control system fault DC supply systems fault DC switchgear and equipment fault
B	At least three of the following:	Multimeters Tong testers Insulation resistance/continuity tester low resistance high current tester Overload injection tester Specialist test equipment
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.

- Suitable work environment, facilities, equipment and materials to undertake actual diagnosis and rectification of faults in power system substation environments.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency of:

Working at realistic heights above ground, i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to low voltage AC/DC control and supervisory systems associated with substation plant and equipment. Control systems may include those associated with HV transformers, tap changers, switchgear and associated control panels, alarms, alternators, mimic panels, cooling systems, automatic voltage regulators, batteries and battery chargers.

Test and measurement instruments may include multimeters, tong testers, insulation resistance/continuity tester, low resistance high current tester, overload injection tester and specialist test equipment

Fault finding and diagnostic techniques may include linear approach, half split rule, sensory detection, loop test, insulation/resistance and continuity tests. Fault indicators may include indication lamps, LEDs, alarms and flag relays.

Initial fault location may be performed with the affected circuits energised.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Identifying hazards
- Inspect
- Legislation
- MSDS

RANGE STATEMENT

- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Quality assurance systems
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Substation Units

UETTDRSB22A Carry out power systems substation inspection

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the security, electrical and environmental inspections of substations. It includes inspection, recording of information and reporting of defective/non-compliant conditions in accordance with established enterprise standards and procedures.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government

License to practice**3)**

legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and

Prerequisite Unit(s)	4)	
		circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	Pathway 1 - Electrician	
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	Pathway 2 – Electrical Fitter	
	UEENEEG199A	Conduct compliance and functional verification of electrical apparatus and existing circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

<p>6) Elements describe the essential outcomes of a competency standard unit</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.</p>
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Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

<p>1 Prepare/plan to carry out substation inspections</p>	<p>1.1 Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p>
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ELEMENT	PERFORMANCE CRITERIA
	1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.
	1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.
	1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.
	1.8 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.
	1.9 Work site is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures.
2 Carry out substation inspections	2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.
	2.2 CPR, Rescue from live electrical apparatus and other related safety procedures are in place

ELEMENT	PERFORMANCE CRITERIA
	according to requirements and established procedures.
	2.3 Safe working documentation is acquired if appropriate and requirements completed in accordance with established procedures.
	2.4 Lifting, climbing and working aloft, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6 Substation equipment, environmental protection systems and security systems are inspected, checked to requirements and as per established procedures.
	2.7 Critical defects are assessed for level of safety/system impact and communicated to appropriate personnel for further action.
	2.8 Minor defects and/or non conformances are rectified in-situ.
	2.9 Essential knowledge and associated skills are applied for the safe carrying out of substation inspections to ensure completion in an agreed timeframe and to quality standards according to requirements.
	2.10 Unplanned events or conditions are responded to in accordance with established procedures.
3 Record the outcomes of substation inspections	3.1 Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Safe working documentation is surrendered if appropriate.

ELEMENT**PERFORMANCE CRITERIA**

- 3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Required works completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of carrying out substation inspection.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB22A Power systems substation inspection

Evidence shall show an understanding of power systems substation inspection to an extent indicated by the following aspects:

T1 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T2 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

REQUIRED SKILLS AND KNOWLEDGE

T3 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure.

T4 Fault conditions and symptoms related to the plant and/or equipment type encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to typical fault conditions and systems
- Interpretation of faults in operating mechanisms which may include drive trains and mechanical power drives, stored energy systems including hydraulic systems, pneumatic systems and mechanical storage systems, accumulators
- Interpretation of faults in electrical control systems which may include electro-mechanical relay systems, micro-processor based systems, PLC systems, integrated control systems or combinations of electrical/mechanical systems
- Types of electrical systems including AC, DC and combinations of both
- Types of fault conditions - failure to operate, failure in service and include the appropriate procedures for work on in service plant/equipment
- Types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over-pressure, under pressure, out of tolerance measurements and checks.

T5 Substation equipment components and materials related to the plant and/or equipment type encompassing:

- Types of components - complete unit of plant and/or equipment, replacement components or appropriate substitutes, their dimensions, suitability and serviceability; also the components associated with the local control systems of the equipment including indication of levels, quantities, volumes, pressures and temperatures and the operating principles of these devices and components
- Types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
- Techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present an OHS hazard to persons in the workplace

T6 Substation safety practices encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation,

REQUIRED SKILLS AND KNOWLEDGE

supply authority regulations and or enterprise requirements pertaining to substation safety practices

- Techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
- Requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from energised conductors
- Requirements for climbing and working at heights in substations - attached climbing principles, selection, use and operation of elevated work platforms and any OHS requirements associated with the use of EWPs
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
- Control of oil spills - identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
- Rescue and release procedures - the rescue personnel from energised conductors, emergency descent from an EWP and may include rescue from confined spaces.
- Enterprise requirements - safe access and Authorisation to Work procedures, use of mobile extendable equipment on or near energised HV conductors, emergency response procedures.
- Hazards associated with work in substations including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, dangers of near approach to energised conductors.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least one of the following:	Transmission substation Distribution substation Traction substation Zone substation Terminal switching stations
B	All of the following:	Substation plant and equipment Substation environmental systems Substation security systems
C	At least ten of the following:	Circuit breakers Transformers Control systems Operating mechanism cabinets Voltage transformers Current transformers Surge arrestors Capacitor banks Static VAR compensator Synchronous condenser Harmonic filters Rectifier transformers Rectifiers Invertors Negative reactors Energy dissipation resistors Disconnectors/isolators Earth switches

		Fault throwing switches Sectionalisers Ac and dc supply systems Control room environs Batteries Chargers Proving de-energised equipment Fire systems equipment Oil spill equipment
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual inspection of plant, equipment and auxiliaries contained in and around substations.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working:

At realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

**Method of
assessment****9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units****9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the inspection of plant, equipment and auxiliaries contained in and around substations including the associated environmental protection and substation security and safety systems.

Checks and measurements include, where appropriate, operation counters, oil in water levels, consumable material consumption, oil containment levels, gas quantities, equipment inspection and condition assessment, lighting and supply conditions.

Security systems include un-authorised access systems (including perimeter wall or fencing and access gates) and alarms systems.

Safety systems include general substation housekeeping and fire systems.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- AC and DC supply systems
- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation

RANGE STATEMENT

- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Substation Units

UETTDRSB23A Install and maintain substation direct current systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of substation DC systems such as main batteries, communication batteries, DC lighting systems, battery chargers, uninterrupted power supply (UPS) systems and associated control circuit in accordance with enterprise requirements. It includes the diagnosis of faults, the replacement of faulty equipment, the conducting of pre-commissioning/re-commissioning tests and the interpretation of test results against agreed specification.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice**3)**

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEO006A	Solve problems in single and three

Prerequisite Unit(s)	4)	
		phase low voltage machines
		Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG033A	
		Arrange circuits, control and protection for general electrical installations
	UEENEEG063A	
		Solve problems in electromagnetic devices and related circuits
	UEENEEG101A	
		Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	
		Install low voltage wiring and accessories
	UEENEEG103A	
		Terminate cables, cords and accessories for low voltage circuits
	UEENEEG106A	
		Select wiring systems and cables for low voltage general electrical installations
	UEENEEG107A	
		Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG108A	
		Develop and connect electrical control circuits
	UEENEEG109A	
		Apply environmentally and sustainable energy procedures in the energy sector
	UEENEEK142A	

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare/plan to install and/or maintain substation DC systems	1.1	Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.3	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
		1.4	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality

ELEMENT	PERFORMANCE CRITERIA
	standards and in accordance with established policies and procedures.
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.
	1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.
	1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.
	1.8 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.
	1.9 Work site is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures.
2 Carry out the installation and maintenance of substation DC systems.	2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.
	2.2 CPR, Rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures.
	2.3 Safe working documentation is acquired and requirements completed in accordance with established procedures.
	2.4 Lifting, climbing and working aloft, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.

ELEMENT**PERFORMANCE CRITERIA**

- 2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.6 Essential knowledge and associated skills are applied for the safe installation and maintenance of substation DC systems to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
- 2.7 Installation of substation DC systems is carried out in accordance with the work schedule and requirements and/or established procedures.
- 2.8 Maintenance of substation DC systems is carried out in accordance with the work schedule and requirements and/or established procedures.
- 2.9 Installation and/or maintenance of substation DC systems are completed in an agreed timeframe and to acceptable quality standards with a minimum of waste according to requirements.
- 2.10 Unplanned events or conditions are responded to in accordance with established procedures.
- 2.11 Performance tests of the substation DC systems are carried out in accordance with established procedures and specifications.
- 2.12 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the installation and maintenance of substation DC systems	<p>3.1 Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.</p> <p>3.2 Safe working documentation is surrendered and equipment made ready for service.</p> <p>3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.</p> <p>3.4 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.5 Required works completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining substation DC systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB23A Substation direct current systems

Evidence shall show an understanding of substation direct current systems to an extent indicated by the following aspects

T1 Safe working on energised low voltage equipment encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on or near energised low voltage conductors - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment
- Work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, release and rescue procedures for work on or near exposed energised LV conductors.

T2 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T3 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures

REQUIRED SKILLS AND KNOWLEDGE

- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T4 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

T5 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T6 Enterprises specific specialised tools encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers, phase rotation)
- Characteristics, capabilities and application of specialised tools for a particular job
- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
- Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
- Techniques in pre-use inspection on the serviceability of specialised tools
- Techniques in the selection, use, maintenance, and care and storage of specialised tools
- Identifying OHS hazards, assessing and controlling risks associated with their use
- Techniques for the safe use of specialised power tools.

REQUIRED SKILLS AND KNOWLEDGE

T7 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms
- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T8 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure.

T9 Fault conditions and symptoms related to the plant and/or equipment type encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to typical fault conditions and systems
- Interpretation of faults in operating mechanisms which may include drive trains and mechanical power drives, stored energy systems including hydraulic systems, pneumatic systems and mechanical storage systems, accumulators
- Interpretation of faults in electrical control systems which may include electro-mechanical relay systems, micro-processor based systems, PLC systems, integrated control systems or combinations of electrical/mechanical systems
- Types of electrical systems including AC, DC and combinations of both
- Types of fault conditions - failure to operate, failure in service and include the appropriate procedures for work on in service plant/equipment
- Types of symptoms - alarms, relay flags, mechanical defects, insulation

REQUIRED SKILLS AND KNOWLEDGE

deterioration, leaks, over-pressure, under pressure, out of tolerance measurements and checks.

T10 Substation equipment components and materials related to the plant and/or equipment type encompassing:

- Types of components - complete unit of plant and/or equipment, replacement components or appropriate substitutes, their dimensions, suitability and serviceability; also the components associated with the local control systems of the equipment including indication of levels, quantities, volumes, pressures and temperatures and the operating principles of these devices and components
- Types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
- Techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present an OHS hazard to persons in the workplace

T11 Substation safety practices encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to substation safety practices
- Techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
- Requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from energised conductors
- Requirements for climbing and working at heights in substations - attached climbing principles, selection, use and operation of elevated work platforms and any OHS requirements associated with the use of EWPs
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
- Control of oil spills - identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
- Rescue and release procedures - the rescue personnel from energised conductors, emergency descent from an EWP and may include rescue from confined spaces.
- Enterprise requirements - safe access and Authorisation to Work procedures, use of mobile extendable equipment on or near energised HV conductors, emergency response procedures.
- Hazards associated with work in substations including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, dangers of near approach to energised conductors.

REQUIRED SKILLS AND KNOWLEDGE

T12 Design principles of Substation LV AC and DC supply systems encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Wiring conventions, systems and labelling conventions
- Substation equipment identification and layout, wiring and schematic diagrams and other appropriate diagrammatic representations
- LV design specifications, supply requirements, electrical load assessments
- Substation LV system distribution requirements - substation batteries, isolation requirements, paralleling requirements, battery chargers, DC distribution panels and control systems, AC distribution panels and control systems, auto change-over requirements,
- Control equipment and auxiliary relays, flags and alarms,
- Common panel layouts.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge

and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and

- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least one of the following:	Nickel cadmium batteries Lead acid batteries Gel cell batteries
B	At least one of the following:	Main batteries Communication batteries
C	All of the following:	Battery chargers DC control circuits
D	At least two of the following:	Cell voltage test Hydrometer/specific gravity test Battery discharge and capacity tests Impedance testing
E	At least one occasion	Dealing with an unplanned event by drawing on essential

		knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of substation DC systems.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working

At realistic heights above ground, i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of DC systems contained in and around substations including the associated control systems.

DC systems may include lighting systems, battery chargers, substation batteries, communication systems batteries, isolated pilot batteries and uninterrupted power supply (UPS) systems.

Checks and measurements include but are not limited to cell voltage test, hydrometer/specific gravity test, battery discharge and capacity tests, impedance tests.

Battery cell types include but not limited to nickel cadmium batteries, lead acid batteries, sealed and unsealed batteries.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation

RANGE STATEMENT

- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Substation Units

UETTDRSB24A Maintain high voltage power system circuit breakers

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of high voltage power system circuit breakers including the diagnosis of faults and the repair and replacement of high voltage power system circuit breakers components in accordance with enterprise requirements. It includes the diagnostic checks, pre-commissioning tests and function checks involving the circuit breakers and their associated control circuits and interpretation of these tests against agreed specifications.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice**3)**

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three

Prerequisite Unit(s)	4)	
		phase low voltage machines
		Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG033A	
		Arrange circuits, control and protection for general electrical installations
	UEENEEG063A	
		Solve problems in electromagnetic devices and related circuits
	UEENEEG101A	
		Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	
		Terminate cables, cords and accessories for low voltage circuits
	UEENEEG106A	
		Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG108A	
		Develop and connect electrical control circuits
	UEENEEG109A	
		Apply environmentally and sustainable energy procedures in the energy sector
	UEENEEK142A	
		Pathway 1 - Electrician
		Install low voltage wiring and accessories
	UEENEEG103A	
		Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG104A	
		Verify compliance and functionality of low voltage general electrical installations
	UEENEEG105A	
		Select wiring systems and cables for low voltage general electrical installations
	UEENEEG107A	
		Pathway 2 – Electrical Fitter

Prerequisite Unit(s) 4)

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to maintain High Voltage power system circuit breakers	1.1 Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.
	1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.
	1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.
	1.8 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.
	1.9 Work site is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out maintenance on high voltage power system circuit breakers	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.</p> <p>2.2 CPR, Rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures.</p> <p>2.3 Safe working documentation is acquired and requirements completed in accordance with established procedures.</p> <p>2.4 Lifting, climbing and working aloft, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.</p> <p>2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.6 Essential knowledge and associated skills are applied for the safe maintenance of HV power system circuit breaker to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.7 Maintenance of HV power system circuit breakers is carried out in accordance with the work schedule and requirements and/or established procedures</p> <p>2.8 Maintenance of HV power system circuit breakers is completed in an agreed timeframe and to quality standards with a minimum of waste according to requirements.</p> <p>2.9 Unplanned events or conditions are responded to in accordance with established procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
3 Complete the maintenance of high voltage power system circuit breakers	<p>3.1 Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.</p> <p>3.2 Safe working documentation is surrendered and High Voltage power system circuit breakers are made ready for service.</p> <p>3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.</p> <p>3.4 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.5 Required works completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining HV power system breakers.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB24A High voltage power system circuit breakers

Evidence shall show an understanding of high voltage power system circuit breakers to an extent indicated by the following aspects:

T1 Safe working on energised low voltage equipment encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on or near energised low voltage conductors - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment
- Work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, release and rescue procedures for work on or near exposed energised LV conductors.

T2 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

T3 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures,

REQUIRED SKILLS AND KNOWLEDGE

evacuation procedures

- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T4 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T5 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

T6 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T7 Enterprises specific specialised tools encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific

REQUIRED SKILLS AND KNOWLEDGE

enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers, phase rotation)

- Characteristics, capabilities and application of specialised tools for a particular job
- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
- Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
- Techniques in pre-use inspection on the serviceability of specialised tools
- Techniques in the selection, use, maintenance, and care and storage of specialised tools
- Identifying OHS hazards, assessing and controlling risks associated with their use
- Techniques for the safe use of specialised power tools.

T8 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms
- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T9 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure.

T10 Fault conditions and symptoms related to the plant and/or equipment type encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation,

REQUIRED SKILLS AND KNOWLEDGE

supply authority regulations and or enterprise requirements pertaining to typical fault conditions and systems

- Interpretation of faults in operating mechanisms which may include drive trains and mechanical power drives, stored energy systems including hydraulic systems, pneumatic systems and mechanical storage systems, accumulators
- Interpretation of faults in electrical control systems which may include electro-mechanical relay systems, micro-processor based systems, PLC systems, integrated control systems or combinations of electrical/mechanical systems
- Types of electrical systems including AC, DC and combinations of both
- Types of fault conditions - failure to operate, failure in service and include the appropriate procedures for work on in service plant/equipment
- Types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over-pressure, under pressure, out of tolerance measurements and checks.

T11 Substation equipment components and materials related to the plant and/or equipment type encompassing:

- Types of components - complete unit of plant and/or equipment, replacement components or appropriate substitutes, their dimensions, suitability and serviceability; also the components associated with the local control systems of the equipment including indication of levels, quantities, volumes, pressures and temperatures and the operating principles of these devices and components
- Types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
- Techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present an OHS hazard to persons in the workplace

T12 Substation safety practices encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to substation safety practices
- Techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
- Requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from energised conductors
- Requirements for climbing and working at heights in substations - attached climbing principles, selection, use and operation of elevated work platforms and any OHS requirements associated with the use of EWPs
- Control of small fires - identification, selection and operation of the appropriate

REQUIRED SKILLS AND KNOWLEDGE

extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires

- Control of oil spills - identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
- Rescue and release procedures - the rescue personnel from energised conductors, emergency descent from an EWP and may include rescue from confined spaces.
- Enterprise requirements - safe access and Authorisation to Work procedures, use of mobile extendable equipment on or near energised HV conductors, emergency response procedures.
- Hazards associated with work in substations including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, dangers of near approach to energised conductors

T13 Design principles of Substation LV AC and DC supply systems encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Wiring conventions, systems and labelling conventions
- Substation equipment identification and layout, wiring and schematic diagrams and other appropriate diagrammatic representations
- LV design specifications, supply requirements, electrical load assessments
- Substation LV system distribution requirements - substation batteries, isolation requirements, paralleling requirements, battery chargers, DC distribution panels and control systems, AC distribution panels and control systems, auto change-over requirements,
- Control equipment and auxiliary relays, flags and alarms,
- Common panel layouts.

T14 Design principles of hydraulic and pneumatic operating mechanism principles encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, standards, supply authority regulations and or enterprise requirements
- Control system operating diagrams, including nomenclature, symbols and operating sequences, units of measurement
- Fundamentals of pressure intensification, forces and energy accumulators
- Applications for substation high voltage equipment - circuit breaker operating mechanisms, interrupter mechanisms, pumps and compressors, GIS operating mechanisms and transformer cooling systems
- Safety precautions for work on hydraulic and/or pneumatic systems - safe working practices and procedures; identification of hazards, assessment and control of OHS risks; types, selection, maintenance and use of personal protective equipment.

T15 Low voltage substation switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to low voltage substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types,

REQUIRED SKILLS AND KNOWLEDGE

characteristics and capabilities of LV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment

- Role and responsibilities of the LV switching operator
- Operational forms, access authorities and permits associated with LV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits
- Use, care and operation of equipment associated with LV substation switching
- LV switchgear – types, categories, application, operating capabilities
- Operation of LV substation switching or indicating devices
- Operation of protection systems and substation equipment
- Restrictions pertaining to LV switching equipment
- Earthing LV electrical apparatus practices and procedures for access
- Low voltage switching techniques
- Restrictions pertaining to Enterprise Specific procedures

T16 Circuit breaker operating principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to circuit breakers
- Requirements for the use of manuals, circuit breaker diagrams/plans and drawings
- Operation of protection systems and substation equipment associated with circuit breakers
- Use, characteristics and capabilities of specialised tools and equipment
- Capabilities of operating mechanisms
- Capabilities of interrupter chambers
- Enterprise Specific Policies and Procedures for the operation of circuit breakers
- Techniques in evaluating serviceability of circuit breaker operation
- Control equipment and auxiliary relays, flags and alarms
- Safety precautions when Constructing circuit breakers - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, access for operating.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of 9.2)
evidence required
to demonstrate
competency in
this unit**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List

A	At least two of the following:	<p>Bulk oil circuit breakers</p> <p>Small oil volume circuit breaker</p> <p>Air blast circuit breaker</p> <p>Vacuum circuit breaker</p> <p>GIS circuit breakers</p> <p>Gas circuit breakers</p>
B	At least two of the following:	<p>Spring operated mechanism</p> <p>Solenoid operated mechanism</p> <p>Hydraulic operated mechanism</p> <p>Pneumatic operated mechanism</p>
C	At least three of the following:	<p>Insulation resistance tests</p> <p>Contact resistance tests</p> <p>Minimum close and open tests (reduced voltage tests)</p> <p>Sequence timing tests</p> <p>Contact travel/timing test</p> <p>Vibration test</p> <p>Gas pressure tests</p>
D	At least two of the following:	<p>Gas measuring devices</p> <p>Pressure measuring devices</p> <p>SF6 gas sampling</p> <p>Oil sampling</p> <p>SF6 moisture content (dew point)</p>
E	At least one occasion	Dealing with an unplanned event by

		drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of HV and EHV circuit breakers in power system substations.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working:

At realistic heights above ground, i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of HV and EHV circuit breakers in power system substations, and switching stations.

Circuit breaker types may include: Bulk oil, small oil volume, air blast, vacuum, air insulated and gas insulated SF6.

Associated control circuits include operating mechanisms, solenoids, spring, hydraulic and pneumatic drives, contactors, AC heaters, tripping and closing circuits and control wiring.

Diagnostic checks may include insulation resistance, contact resistance (dynamic and static), timing (in-service and out of service), gas pressure, air pressure, gas density, oil pressure, minimum operate checks.

Specialised tools may include insulation resistance test sets, contact resistance tester, trip and close coil testers, manufacturer's specific tools, sequence timing equipment.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards

RANGE STATEMENT

- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Substation Units

UETTDRSB25A Maintain high voltage power and instrument transformers

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of high voltage power system transformers and instrument transformers including routine diagnostic tests within agreed specifications. It includes maintenance of the associated cooling systems, control and alarm systems and tertiary cabling and/or busbar systems in accordance with enterprise procedures.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice**3)**

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines

Prerequisite Unit(s)	4)	
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	Pathway 1 - Electrician	
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	Pathway 2 – Electrical Fitter	
	UEENEEG199A	Conduct compliance and functional verification of electrical apparatus

Prerequisite Unit(s) 4)

and existing circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to maintain HV power system transformers and instrument transformers	1.1 Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.
	1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.
	1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.
	1.8 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.
	1.9 Work site is prepared according to the work schedule and to minimise risk and damage to

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the maintenance of transformers and instrument transformers	property and personnel in accordance with established procedures.
	2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.
	2.2 CPR, Rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures.
	2.3 Safe working documentation is acquired and requirements completed in accordance with established procedures.
	2.4 Lifting, climbing and working aloft, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are monitored and preventive action taken and/or appropriate authorities consulted where necessary in accordance with established procedures.
	2.6 Essential knowledge and associated skills are applied for the safe maintenance of HV power system transformers and instrument transformers to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.7 Transformer/instrument transformer is isolated and maintained in accordance with manufacturers and enterprise procedures and recommendations.
	2.8 Diagnostic measurements are carried out and results interpreted, analysed and recorded as per established procedures.
	2.9 Transformer/instrument transformer is restored

ELEMENT	PERFORMANCE CRITERIA
	in accordance with established policies and procedures.
	2.10 Unplanned events or conditions are responded to in accordance with established procedures.
3 Complete the maintenance of transformers and instrument transformers	3.1 Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Safe working documentation is surrendered and transformer/instrument transformer made ready for service.
	3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Required works completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining HV power system transformers and instrument transformers.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB25A High voltage power and instrument transformers

Evidence shall show an understanding of high voltage power and instrument transformers to an extent indicated by the following aspects:

T1 Safe working on energised low voltage equipment encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on or near energised low voltage conductors - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment
- Work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, release and rescue procedures for work on or near exposed energised LV conductors.

T2 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

T3 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures,

REQUIRED SKILLS AND KNOWLEDGE

evacuation procedures

- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T4 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T5 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

T6 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T7 Enterprises specific specialised tools encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific

REQUIRED SKILLS AND KNOWLEDGE

enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers, phase rotation)

- Characteristics, capabilities and application of specialised tools for a particular job
- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
- Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
- Techniques in pre-use inspection on the serviceability of specialised tools
- Techniques in the selection, use, maintenance, and care and storage of specialised tools
- Identifying OHS hazards, assessing and controlling risks associated with their use
- Techniques for the safe use of specialised power tools.

T8 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms
- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T9 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure.

T10 Fault conditions and symptoms related to the plant and/or equipment type encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation,

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supply authority regulations and or enterprise requirements pertaining to typical fault conditions and systems

- Interpretation of faults in operating mechanisms which may include drive trains and mechanical power drives, stored energy systems including hydraulic systems, pneumatic systems and mechanical storage systems, accumulators
- Interpretation of faults in electrical control systems which may include electro-mechanical relay systems, micro-processor based systems, PLC systems, integrated control systems or combinations of electrical/mechanical systems
- Types of electrical systems including AC, DC and combinations of both
- Types of fault conditions - failure to operate, failure in service and include the appropriate procedures for work on in service plant/equipment
- Types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over-pressure, under pressure, out of tolerance measurements and checks.

T11 Substation equipment components and materials related to the plant and/or equipment type encompassing:

- Types of components - complete unit of plant and/or equipment, replacement components or appropriate substitutes, their dimensions, suitability and serviceability; also the components associated with the local control systems of the equipment including indication of levels, quantities, volumes, pressures and temperatures and the operating principles of these devices and components
- Types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
- Techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present an OHS hazard to persons in the workplace

T12 Substation safety practices encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to substation safety practices
- Techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
- Requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from energised conductors
- Requirements for climbing and working at heights in substations - attached climbing principles, selection, use and operation of elevated work platforms and any OHS requirements associated with the use of EWPs
- Control of small fires - identification, selection and operation of the appropriate

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extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires

- Control of oil spills - identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
- Rescue and release procedures - the rescue personnel from energised conductors, emergency descent from an EWP and may include rescue from confined spaces.
- Enterprise requirements - safe access and Authorisation to Work procedures, use of mobile extendable equipment on or near energised HV conductors, emergency response procedures.
- Hazards associated with work in substations including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, dangers of near approach to energised conductors

T13 Design principles of Substation LV AC and DC supply systems encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Wiring conventions, systems and labelling conventions
- Substation equipment identification and layout, wiring and schematic diagrams and other appropriate diagrammatic representations
- LV design specifications, supply requirements, electrical load assessments
- Substation LV system distribution requirements - substation batteries, isolation requirements, paralleling requirements, battery chargers, DC distribution panels and control systems, AC distribution panels and control systems, auto change-over requirements,
- Control equipment and auxiliary relays, flags and alarms,
- Common panel layouts.

T14 Design principles of high voltage insulation systems encompassing:

- Insulation design principles - common materials used, electrical characteristics, thermal characteristics, uses and applications to substation high voltage plant and equipment, grading, construction, cooling.
- Common contaminants and their effects - internal contaminants, external contaminants
- Testing and measurement of insulation quality - test types and common measuring instruments and techniques, resistance and resistivity, losses, measurement errors, temperature corrections, safe work practices related to testing and measurement
- Safety precautions when testing and measuring high voltage insulation systems - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment

T15 Principles of power transformer construction and operations encompassing:

- Transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step down transformers, transmission and generation types

REQUIRED SKILLS AND KNOWLEDGE

- Reactor types - shunt and series, applications and design considerations
- Iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
- Winding configurations and construction techniques - helical, spiral, disc, interleaved disc types
- Insulation methods and techniques - fully insulated windings and graded insulation techniques, oil filled and gas filled power transformers
- Transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, impedance percent
- Nameplate details - BIL, tapping winding detail, physical layout, cooling ratings, physical details
- Transformer and reactor cooling types and their effects on design and rating
- Transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
- Winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
- Operating constraints as single units and in parallel
- Tapping windings - placement issues, tapping range, OLTC versus off load TC techniques, types in use (high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types), control system characteristics.
- High voltage bushing selection – type, insulation system used, rating, BIL, selection criteria, testing considerations

T16 Low voltage substation switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to low voltage substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment
- Role and responsibilities of the LV switching operator
- Operational forms, access authorities and permits associated with LV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits
- Use, care and operation of equipment associated with LV substation switching
- LV switchgear – types, categories, application, operating capabilities
- Operation of LV substation switching or indicating devices
- Operation of protection systems and substation equipment
- Restrictions pertaining to LV switching equipment
- Earthing LV electrical apparatus practices and procedures for access
- Low voltage switching techniques
- Restrictions pertaining to Enterprise Specific procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least one of the following:	Power transformer High voltage reactor
B	At least two of the following:	Auxiliary transformer Current transformer Voltage transformer
C	At least two of the following:	Insulation resistance tests Dielectric dissipation factor tests Low voltage excitation checks Frequency response analysis Recovery voltage measurements Ratio checks Winding resistance tests Oil sampling Low resistance, high current connection testing
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of transformers and instrument transformers

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working:

At realistic heights above ground, i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit may be demonstrated in relation to substation transformers and instrument transformers, including potential transformers, current transformers, power transformers and auxiliary transformers.

Diagnostic checks and measurements may include oil sampling, insulation resistance, winding resistance, dielectric dissipation factor, winding ratio, vector group, low voltage excitation, frequency response analysis and recovery voltage measurements.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Substation Units

UETTDRSB26A Install high current DC equipment and switchgear

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation of DC switchgear and other equipment which may include rectifier transformers, rectifiers, invertors, isolators and links, harmonic filters, negative reactors and EDR's to ensure correct installation to prescribed procedures and standards. It also encompasses the isolation of systems and/or circuits for safe working according to work plans and the visual inspection and necessary checks to ensure that equipment and components have been correctly installed according to design and are in a safe condition for pre-commissioning tests prior to energisation, as well as updating of installation data and relevant quality assurance documentation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a

License to practice**3)**

licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Prerequisite Unit(s)	4)	
		Document and apply measures to control OHS risks associated with electrotechnology work
	UEENEEE137A	
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they

have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare/plan to Install high current DC switchgear and equipment	1.1	Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.3	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established

ELEMENT	PERFORMANCE CRITERIA
	procedures.
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.
	1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.
	1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.
	1.8 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures
	1.9 Work site is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures.
2 Carry out installation of high current DC switchgear and equipment	2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.
	2.2 CPR, Rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures.
	2.3 Safe working documentation is acquired and requirements completed in accordance with

ELEMENT	PERFORMANCE CRITERIA
	established procedures.
	2.4 Lifting, climbing and working aloft, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6 Installation of high current DC switchgear and equipment is carried out, in accordance with the work schedule and requirements and/or established procedures.
	2.7 Essential knowledge and associated skills are applied for the safe installation of high current DC switchgear and equipment to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.8 Unplanned events or conditions are responded to in accordance with established procedures.
3 Complete installation of high current DC switchgear and equipment	3.1 Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Safe working documentation is surrendered and equipment made ready for service.
	3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Required works completion records, reports and/or documentation and information are completed, processed and appropriate

ELEMENT

PERFORMANCE CRITERIA

personnel notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing high current DC switchgear and equipment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB26A High current DC equipment and switchgear - installation

Evidence shall show an understanding of high current DC equipment and switchgear - installation to an extent indicated by the following aspects:

T1 Safe working on energised low voltage equipment encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on or near energised low voltage conductors - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment
- Work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, release and rescue procedures for work on or near exposed energised LV conductors.

T2 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T3 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures

REQUIRED SKILLS AND KNOWLEDGE

- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T4 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

T5 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T6 Enterprises specific specialised tools encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers, phase rotation)
- Characteristics, capabilities and application of specialised tools for a particular job
- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
- Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
- Techniques in pre-use inspection on the serviceability of specialised tools
- Techniques in the selection, use, maintenance, and care and storage of specialised tools
- Identifying OHS hazards, assessing and controlling risks associated with their use
- Techniques for the safe use of specialised power tools.

REQUIRED SKILLS AND KNOWLEDGE

T7 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms
- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T8 Substation DC circuit breaker principles encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the DC circuit breakers
- Types of DC CB's - self and withdrawable types
- Characteristics of DC CB's - purpose of DC CB's, application of DC CB's
- Principles of operation of different types of DC CB's - arc expulsion versus arc containment, latched versus magnetically held, advantages and disadvantages of different types, fixed or withdrawable, protection/diagnostic technology.
- Principles of operation of high speed DC CB – characteristics, calibration
- How DC CB's are designated - feeder, rectifier, EDR, bus-section and negative breakers, auto-reclose or non auto-reclose type
- Type and function of DC CB peripheral components - delta I relays, busbar, control wiring, trunk and associated plug/receptacle
- Identification, characteristics, application and care of DC CB components - holding coils, closing coils, contactors, resistors, arc chutes, blow-out coils, arcing contacts, main contacts, braids, moving arm, pole face, arcing horns, electronic cards, dashpots, fingers, diode strings, fuses, insulators, latching mechanisms, motors, wiring, relays
- Characteristics, application and care of hand and specialised tools used on DC CB's - combination/multigrips/long nose pliers, side cutters, screwdrivers, wire strippers, crimpers, knife, hacksaw, hammers, mallets, levels, tape measures, spanners, T-wrench, pistol drills, battery drills, heat gun, de-soldering tools and soldering iron/torches, Allen keys, socket spanners, gauges, feeler gauges and specialist tools supplied by the manufacturers
- Characteristics, application and care of test and measurement instruments used on DC CB's - multimeters, tong testers, ammeters, voltmeters, ohmmeters, test lamps,

REQUIRED SKILLS AND KNOWLEDGE

high and low voltage insulation resistance/ continuity testers, earth resistance tester, Ductor, drop-out test sets.

T9 Installation of substation Direct Current circuit breakers (DC CB's) and associated equipment encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation of substation Direct Current circuit breakers (DC CB's)
- Safety precautions when installing substation Direct Current circuit breakers (DC CB's) - safe operation procedures, Occupational Health and Safety hazards and precautions, identification of hazards, assessing and controlling risks, types, selection, maintenance and uses of personnel protective equipment, permit to work systems and isolation procedures, safe working practices when using specialised equipment, emergency response and rescue including First Aid etc.
- Use and interpretation of technical manuals and diagrams - manufacturer/Enterprise Manuals, block, wiring and schematic diagrams, 1500 V sectioning diagrams, substation HV operating diagrams, substation arrangement diagrams and layout drawings, technical/manufactures' specifications, maintenance instructions/schedules
- Techniques in the safe installation of DC CB's.

T10 Low voltage substation switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to low voltage substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment
- Role and responsibilities of the LV switching operator
- Operational forms, access authorities and permits associated with LV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits
- Use, care and operation of equipment associated with LV substation switching
- LV switchgear – types, categories, application, operating capabilities
- Operation of LV substation switching or indicating devices
- Operation of protection systems and substation equipment
- Restrictions pertaining to LV switching equipment
- Earthing LV electrical apparatus practices and procedures for access
- Low voltage switching techniques
- Restrictions pertaining to Enterprise Specific procedures

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	Multimeters Low resistance high current Megger tester Ammeter Voltmeter 1500 V drop out tester Wiring diagrams Schematic drawings Operating and substation arrangement diagrams Building layouts Cable block and schedule diagrams
B	At least six of the following:	Direct current circuit breakers Rectifier transformers Rectifiers Isolators and links Harmonic filters Negative reactors Energy dissipation resistors
C	At least ten of the following:	DC feeders Surge arresters Isolating links Busbar Cables Cable supports Pits and enclosures Protection/alarm systems Control wiring

		Metering Supervisory interface Cabinets REC
D	At least three of the following:	Buchholz Frame leakage Overcurrent Earth leakage Reverse current Delta i Diode protection
E	All of the following:	Cable terminations Busbar termination/joint Alignment of electrical contacts of withdrawable equipment
F	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to undertake actual installation of high current DC switchgear and equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working:

Below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation of high current DC switchgear and equipment

DC switchgear and other equipment include but are not limited to direct current circuit breakers, rectifier transformers, rectifiers, invertors, isolators and links, harmonic filters, negative reactors, energy dissipating resistors (EDR's) and rail earth contactor.

Associated equipment may include DC feeders, surge arresters, isolating links, busbar, cables, cable supports, pits and enclosures, control wiring of protection/alarm systems, metering, supervisory interface and cabinets.

Test and measurement equipments may include multimeters, low resistance high current, megger tester, ammeter, voltmeter, 1500 V dropout test sets.

Drawings can refer to wiring, schematic, operating and substation arrangement diagrams, cable block and schedule diagrams and building layouts.

Confined Spaces may apply to pits, cable tunnels, false floors, and cable basements.

Protection systems may include Buchholz, frame leakage, overcurrent, earth leakage, reverse current, Delta I and diode protection.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures

RANGE STATEMENT

- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Substation Units

UETTDRSB27A Maintain high current DC equipment and switchgear

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of DC switchgear and other equipment which may include rectifier transformers, rectifiers, invertors, isolators and links, harmonic filters, negative reactors and EDRs. It encompasses the maintenance, including the diagnosing of faults and replacement and repair to ensure correct maintenance to prescribed procedures and standards. It also encompasses the isolation of systems and/or circuits for safe working according to work plans and the visual inspection and necessary checks to ensure safe energisation, as well as updating of maintenance data and relevant quality assurance documentation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to

License to practice**3)**

regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with

Prerequisite Unit(s)	4)	
		electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	Pathway 1 - Electrician	
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical

Prerequisite Unit(s) 4)

installations

Pathway 2 – Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to maintain high current DC switchgear and equipment	1.1 Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.
	1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.
	1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.
	1.8 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.
	1.9 Work site is prepared according to the work schedule and to minimise risk and damage to

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the maintenance of high current DC switchgear and equipment	property and personnel in accordance with established procedures.
	2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.
	2.2 CPR, Rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures.
	2.3 Safe working documentation is acquired and requirements completed in accordance with established procedures.
	2.4 Lifting, climbing and working aloft, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6 Maintenance and repair of high current DC switchgear and equipment is carried out, in accordance with the work schedule and requirements and/or established procedures.
	2.7 Essential knowledge and associated skills are applied for the safe maintenance of high current DC switchgear and equipment to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements.
	2.8 Unplanned events or conditions are responded to in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the maintenance of high current DC switchgear and equipment	<p>3.1 Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.</p> <p>3.2 Safe working documentation is surrendered and equipment made ready for service.</p> <p>3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.</p> <p>3.4 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.5 Required works completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining high current DC switchgear and equipment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB27A High current DC equipment and switchgear - maintenance

Evidence shall show an understanding of high current DC equipment and switchgear - maintenance to an extent indicated by the following aspects:

T1 Safe working on energised low voltage equipment encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on or near energised low voltage conductors - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment
- Work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, release and rescue procedures for work on or near exposed energised LV conductors.

T2 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T3 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures

REQUIRED SKILLS AND KNOWLEDGE

- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T4 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

T5 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T6 Enterprises specific specialised tools encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers, phase rotation)
- Characteristics, capabilities and application of specialised tools for a particular job
- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
- Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
- Techniques in pre-use inspection on the serviceability of specialised tools
- Techniques in the selection, use, maintenance, and care and storage of specialised tools
- Identifying OHS hazards, assessing and controlling risks associated with their use
- Techniques for the safe use of specialised power tools.

REQUIRED SKILLS AND KNOWLEDGE

T7 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms
- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T8 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure.

T9 Substation DC circuit breaker principles encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the DC circuit breakers
- Types of DC CB's - self and withdrawable types
- Characteristics of DC CB's - purpose of DC CB's, application of DC CB's
- Principles of operation of different types of DC CB's - arc expulsion versus arc containment, latched versus magnetically held, advantages and disadvantages of different types, fixed or withdrawable, protection/diagnostic technology.
- Principles of operation of high speed DC CB – characteristics, calibration
- How DC CB's are designated - feeder, rectifier, EDR, bus-section and negative breakers, auto-reclose or non auto-reclose type
- Type and function of DC CB peripheral components - delta I relays, busbar, control wiring, trunk and associated plug/receptacle
- Identification, characteristics, application and care of DC CB components - holding coils, closing coils, contactors, resistors, arc chutes, blow-out coils, arcing

REQUIRED SKILLS AND KNOWLEDGE

contacts, main contacts, braids, moving arm, pole face, arcing horns, electronic cards, dashpots, fingers, diode strings, fuses, insulators, latching mechanisms, motors, wiring, relays

- Characteristics, application and care of hand and specialised tools used on DC CB's - combination/multigrips/long nose pliers, side cutters, screwdrivers, wire strippers, crimpers, knife, hacksaw, hammers, mallets, levels, tape measures, spanners, T-wrench, pistol drills, battery drills, heat gun, de-soldering tools and soldering iron/torches, Allen keys, socket spanners, gauges, feeler gauges and specialist tools supplied by the manufacturers
- Characteristics, application and care of test and measurement instruments used on DC CB's - multimeters, tong testers, ammeters, voltmeters, ohmmeters, test lamps, high and low voltage insulation resistance/ continuity testers, earth resistance tester, Ductor, drop-out test sets.

T10 Maintenance of substation DC circuit breakers and associated equipment encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the maintenance of DC circuit breakers
- Requirements for the use and interpretation of manuals, system diagrams/plans and drawings - 1500V sectioning diagrams, substation HV operating diagrams, substation arrangement diagrams and layout drawings, technical/manufactures' specifications, maintenance instructions/schedules.
- Relationship and function of DC CB's equipment/component interface - DC CB frame, connection fingers, associated busbar, physical arrangements and clearances.
- Safety precautions when undertaking maintenance procedures on DC CB's - safe working practices, Occupational Health and Safety hazards and precautions, identification of hazards, assessing and controlling risks, types, selection, maintenance and uses of personnel protective equipment, permit to work systems and isolation procedures, types and function of specialised equipment, safe working practices when using specialised equipment, emergency response and rescue including First Aid etc.
- Techniques in maintenance of DC CB's - closing and opening operations, range settings, adjustments and calibration, spring settings, main contact arrangement and auxiliary contact arrangement, arc chute inspection and procedures, basic fault finding and repair/adjustment techniques, control cards, their uses, application and fault finding, earthing requirements and techniques
- Techniques in testing and commissioning of DC CB's - supply authority regulations and or enterprise requirements, standards and procedures.

T11 Installation of substation Direct Current circuit breakers (DC CB's) and associated equipment encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation of substation Direct Current circuit

REQUIRED SKILLS AND KNOWLEDGE

breakers (DC CB's)

- Safety precautions when installing substation Direct Current circuit breakers (DC CB's) - safe operation procedures, Occupational Health and Safety hazards and precautions, identification of hazards, assessing and controlling risks, types, selection, maintenance and uses of personnel protective equipment, permit to work systems and isolation procedures, safe working practices when using specialised equipment, emergency response and rescue including First Aid etc.
- Use and interpretation of technical manuals and diagrams - manufacturer/Enterprise Manuals, block, wiring and schematic diagrams, 1500 V sectioning diagrams, substation HV operating diagrams, substation arrangement diagrams and layout drawings, technical/manufactures' specifications, maintenance instructions/schedules
- Techniques in the safe installation of DC CB's.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the

most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in

accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and

- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Multimeters Low resistance high current Megger tester Ammeter Voltmeter 1500 V drop out tester Wiring diagrams Schematic drawings Operating and substation arrangement diagrams Building layouts Cable block and schedule diagrams
B	At least six of the following:	Direct current circuit breakers Rectifier transformers Rectifiers Isolators and links Harmonic filters

		Negative reactors Energy dissipation resistors
C	At least ten of the following:	DC feeders Surge arresters Isolating links Busbar Cables Cable supports Pits and enclosures Protection/alarm systems Control wiring Metering Supervisory interface Cabinets REC
D	All of the following:	Cable terminations Busbar termination/joint Alignment of electrical contacts of withdrawable equipment
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of high current DC switchgear and equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working:

Below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of high current DC switchgear and equipment.

DC switchgear and other equipment includes but is not limited to Direct Current Circuit Breakers, rectifier transformers, rectifiers, invertors, isolators and links, harmonic filters, negative reactors and energy dissipating resistors (EDR's) and rail earth contactor.

Associated equipment may include DC feeders, surge arresters, isolating links, busbar, cables, cable supports, pits and enclosures, protection/alarm systems, control wiring, metering, supervisory interface, cabinets,

Associated components may include main and auxiliary contacts, holding coils, contactor, busbar fingers, diodes, heatsinks, capacitors, fuses, metering, shunts, resistors banks, resistor bank housing.

Test and measurement equipments may include multimeters, low resistance high current, megger tester, ammeter, voltmeter, 1500V drop out test set, feeler gauge.

Drawings can refer to wiring, schematic, operating and substation arrangement diagrams, cable block and schedule diagrams and building layouts.

Confined Spaces may apply to pits, cable tunnels, false floors, and cable basements.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation

RANGE STATEMENT

- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Substation Units

UETTDRSB29A Maintain capacitor bank equipment for voltage regulation

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance and repair of substation voltage regulating equipment and is restricted to high voltage capacitor banks and their associated switching reactors and the inspection, recording of information, testing and measurement of the associated control circuits. It also includes the range of acceptance tests and discharge requirements for complete units within a substation in accordance with established enterprise standards and procedures. It also encompasses fault diagnosis and return to service tests and interpretation of test results against agreed specifications.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in

License to practice**3)**

workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with

Prerequisite Unit(s)	4)	electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to maintain voltage regulating equipment (capacitor banks)	<p>1.1 Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.</p> <p>1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.</p> <p>1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.</p> <p>1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.</p> <p>1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.</p>

ELEMENT**PERFORMANCE CRITERIA**

- | | | |
|---|---|---|
| | 1.8 | Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures. |
| | 1.9 | Work site is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures. |
| 2 | Carry out the maintenance of voltage regulating equipment (capacitor banks) | |
| | 2.1 | OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures. |
| | 2.2 | CPR, rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures. |
| | 2.3 | Safe working documentation is acquired and requirements completed in accordance with established procedures. |
| | 2.4 | Lifting, climbing and working aloft, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures. |
| | 2.5 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| | 2.6 | Capacitor bank is isolated, discharged and maintained in accordance with requirements. |
| | 2.7 | Defective capacitor elements are identified, located and replaced in accordance with manufacturers and enterprise procedures and recommendations. |
| | 2.8 | Capacitor network is balanced and pre-service tests and measurements completed in accordance |

ELEMENT	PERFORMANCE CRITERIA
	with enterprise procedures.
	2.9 Essential knowledge and associated skills are applied for the safe maintenance of voltage regulating equipment (capacitor banks) to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements.
	2.10 Unplanned events or conditions are responded to in accordance with established procedures.
3 Complete the maintenance of voltage regulating equipment (capacitor banks)	3.1 Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
	3.2 Safe working documentation is surrendered and the capacitor bank is made ready for service.
	3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Required works completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining voltage regulating equipment - capacitor banks.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB29A Capacitor bank equipment for voltage regulation

Evidence shall show an understanding of capacitor bank equipment for voltage regulation to an extent indicated by the following aspects:

T1 Safe working on energised low voltage equipment encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on or near energised low voltage conductors - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment
- Work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, release and rescue procedures for work on or near exposed energised LV conductors.

T2 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T3 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures

REQUIRED SKILLS AND KNOWLEDGE

- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T4 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

T5 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T6 Enterprises specific specialised tools encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers, phase rotation)
- Characteristics, capabilities and application of specialised tools for a particular job
- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
- Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
- Techniques in pre-use inspection on the serviceability of specialised tools
- Techniques in the selection, use, maintenance, and care and storage of specialised tools
- Identifying OHS hazards, assessing and controlling risks associated with their use
- Techniques for the safe use of specialised power tools.

REQUIRED SKILLS AND KNOWLEDGE

T7 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms
- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T8 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure.

T9 Fault conditions and symptoms related to the plant and/or equipment type encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to typical fault conditions and systems
- Interpretation of faults in operating mechanisms which may include drive trains and mechanical power drives, stored energy systems including hydraulic systems, pneumatic systems and mechanical storage systems, accumulators
- Interpretation of faults in electrical control systems which may include electro-mechanical relay systems, micro-processor based systems, PLC systems, integrated control systems or combinations of electrical/mechanical systems
- Types of electrical systems including AC, DC and combinations of both
- Types of fault conditions - failure to operate, failure in service and include the appropriate procedures for work on in service plant/equipment
- Types of symptoms - alarms, relay flags, mechanical defects, insulation

REQUIRED SKILLS AND KNOWLEDGE

deterioration, leaks, over-pressure, under pressure, out of tolerance measurements and checks.

T10 Substation equipment components and materials related to the plant and/or equipment type encompassing:

- Types of components - complete unit of plant and/or equipment, replacement components or appropriate substitutes, their dimensions, suitability and serviceability; also the components associated with the local control systems of the equipment including indication of levels, quantities, volumes, pressures and temperatures and the operating principles of these devices and components
- Types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
- Techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present an OHS hazard to persons in the workplace

T11 Substation safety practices encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to substation safety practices
- Techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
- Requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from energised conductors
- Requirements for climbing and working at heights in substations - attached climbing principles, selection, use and operation of elevated work platforms and any OHS requirements associated with the use of EWPs
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
- Control of oil spills - identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
- Rescue and release procedures - the rescue personnel from energised conductors, emergency descent from an EWP and may include rescue from confined spaces.
- Enterprise requirements - safe access and Authorisation to Work procedures, use of mobile extendable equipment on or near energised HV conductors, emergency response procedures.
- Hazards associated with work in substations including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, dangers of near approach to energised conductors

REQUIRED SKILLS AND KNOWLEDGE

T12 Principles of power transformer construction and operations encompassing:

- Applications of static reactive plant in high voltage networks, including voltage control, VAR control, transient response capacity
- Types of static reactive plant including high voltage capacitors, high voltage reactors, static VAR compensators and combinations of these
- Operating characteristics and operational constraints including point on wave switching issues
- Ratings, cooling systems and control systems and ancillary equipment used
- Configurations and system layout including single star, double star, bridge type
- Typical protection systems used including neutral unbalance current, neutral unbalance voltage
- Techniques used when balancing elements within static reactive plant
- Safety precautions when testing and maintaining high voltage static reactive plant - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full

can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least one of the following:	Double star neutral current unbalance type Voltage unbalance type, single star
B	At least two of the following:	Internal discharge resistor cans External resistor type Switching reactors Neutral unbalance current transformer
C	At least three of the following:	Insulation resistance tests Capacitance tests Unbalance current/voltage tests Primary injection tests High voltage dc

		withstand tests
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of high voltage regulating equipment capacitor banks and their associated reactors and control circuits installed in substations.

In addition to the resources listed above, in context of and specific resources for assessment, evidence should show demonstrated competency working:

At realistic heights above ground, i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all

necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit may be demonstrated in relation to high voltage capacitor banks and their associated reactors and control circuits installed in substations.

Checks and measurements may include inspection and cleaning, identification and replacement of defective/unserviceable elements/cans, unbalance current/voltage tests, functional tests and control/alarm system checks.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Substation Units

UETTDRSB30A Maintain high voltage power system static VAR compensators (SVC)

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance and repair of high voltage power system static VAR compensators including the diagnosis of faults and the replacement and repairing of high voltage power system static VAR compensator components in accordance with enterprise requirements. It includes diagnostic and return to service tests and the interpretation of tests results against agreed specifications.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEO006A	Solve problems in single and three phase low voltage machines

Prerequisite Unit(s)

4)

UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in electromagnetic devices and related circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable energy procedures in the energy sector

UETTDRSB25A Maintain high voltage power and instrument transformers

UETTDRSB29A Maintain capacitor bank equipment for voltage regulation

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical

Prerequisite Unit(s) 4)

installations

Pathway 2 – Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to maintain high voltage power system static VAR compensators	1.1 Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.
	1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.
	1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.
	1.8 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.
	1.9 Work site is prepared according to the work schedule and to minimise risk and damage to

ELEMENT	PERFORMANCE CRITERIA
2 Carry out maintenance on high voltage power system static VAR compensators	property and personnel in accordance with established procedures.
	2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.
	2.2 CPR, rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures.
	2.3 Safe working documentation is acquired and requirements completed in accordance with established procedures.
	2.4 Lifting, climbing and working aloft, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6 Maintenance and repair of high voltage power system static VAR compensators is carried out and in accordance with the work schedule and requirements and/or established procedures.
	2.7 Essential knowledge and associated skills are applied for the safe maintenance and repair of high voltage power system static VAR compensators to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements.
	2.8 Pre-service tests and measurements are conducted in accordance with enterprise procedures.
2.9 Unplanned events or conditions are responded to in accordance with established procedures.	

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|---|-----|---|
| 3 | Complete the maintenance of high voltage power system static VAR compensators | 3.1 | Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures. |
| | | 3.2 | Safe working documentation is surrendered and high voltage static VAR compensator is made ready for service. |
| | | 3.3 | Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures. |
| | | 3.4 | Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures. |
| | | 3.5 | Required works completion records, reports and/or documentation and information are completed processed and appropriate personnel notified in accordance with established procedures. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining HV power system static VAR compensators.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB30A High voltage power system static VAR compensators (SVC)

Evidence shall show an understanding of high voltage power system static VAR compensators (SVC) to an extent indicated by the following aspects:

T1 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T2 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

REQUIRED SKILLS AND KNOWLEDGE

T3 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

T4 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T5 Enterprises specific specialised tools encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers, phase rotation)
- Characteristics, capabilities and application of specialised tools for a particular job
- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
- Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
- Techniques in pre-use inspection on the serviceability of specialised tools
- Techniques in the selection, use, maintenance, and care and storage of specialised tools
- Identifying OHS hazards, assessing and controlling risks associated with their use
- Techniques for the safe use of specialised power tools.

T6 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T7 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure.

T8 Principles of power system static VAR compensators encompassing:

- Applications of static reactive plant in high voltage networks, including voltage control, VAR control, transient response capacity
- Types of static reactive plant including high voltage capacitors, high voltage reactors, static VAR compensators and combinations of these
- Operating characteristics and operational constraints including point on wave switching issues
- Ratings, cooling systems and control systems and ancillary equipment used
- Configurations and system layout including single star, double star, bridge type
- Typical protection systems used including neutral unbalance current, neutral unbalance voltage
- Techniques used when balancing elements within static reactive plant
- Safety precautions when testing and maintaining high voltage static reactive plant - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least two of the following:	SVC power transformer SVC auxiliary transformer Capacitors Reactors Cooling equipment
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance and repair of high voltage power system static VAR compensators including the diagnosis of faults and the replacement and repairing of high voltage power system static VAR compensator components.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working:

Heights above ground, i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit may be demonstrated in relation to the maintenance and repair of high voltage power system static VAR compensators installed in substations.

Checks and measurements may include inspection and cleaning, identification of defective/unserviceable components, functional tests and control/alarm system checks.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Substation Units

UETTDRSB31A Maintain high voltage power system synchronous condensers

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of high voltage power system synchronous condensers including the diagnosis of faults and the replacement and repairing of high voltage power system synchronous condenser components in accordance with enterprise requirements. It encompasses the diagnostic and pre-commissioning tests involving synchronous condensers and the interpretation of these tests against agreed specifications.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice**3)**

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three

Prerequisite Unit(s)	4)	
		phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	Pathway 1 - Electrician	
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	Pathway 2 – Electrical Fitter	

Prerequisite Unit(s) 4)

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to maintain high voltage power system synchronous condensers	1.1 Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.
	1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.
	1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.
	1.8 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.
	1.9 Work site is prepared according to the work schedule and to minimise risk and damage to

ELEMENT**PERFORMANCE CRITERIA**

		property and personnel in accordance with established procedures.
2	Carry out maintenance on high voltage power system synchronous condensers	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.</p> <p>2.2 CPR, Rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures.</p> <p>2.3 Safe working documentation is acquired and requirements completed in accordance with established procedures.</p> <p>2.4 Lifting, climbing and working aloft, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.</p> <p>2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.6 Maintenance of high voltage power system synchronous condensers is carried out in accordance with the work schedule and requirements and/or established procedures.</p> <p>2.7 Essential knowledge and associated skills are applied for the safe maintenance of high voltage power system synchronous condensers to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements.</p> <p>2.8 Pre-service tests and measurements are conducted in accordance with enterprise procedures.</p> <p>2.9 Unplanned events or conditions are responded to in accordance with established procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
3 Complete the maintenance of high voltage power system synchronous condensers	<p>3.1 Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.</p> <p>3.2 Safe working documentation is surrendered and the power system synchronous condenser made ready for service.</p> <p>3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.</p> <p>3.4 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.5 Required works completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining HV power system synchronous condensers.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB31A High voltage power system synchronous condensers

Evidence shall show an understanding of high voltage power system synchronous condensers to an extent indicated by the following aspects:

T1 Safe working on energised low voltage equipment encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on or near energised low voltage conductors - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment
- Work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, release and rescue procedures for work on or near exposed energised LV conductors.

T2 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

T3 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures,

REQUIRED SKILLS AND KNOWLEDGE

evacuation procedures

- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T4 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T5 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

T6 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T7 Enterprises specific specialised tools encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific

REQUIRED SKILLS AND KNOWLEDGE

enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers, phase rotation)

- Characteristics, capabilities and application of specialised tools for a particular job
- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
- Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
- Techniques in pre-use inspection on the serviceability of specialised tools
- Techniques in the selection, use, maintenance, and care and storage of specialised tools
- Identifying OHS hazards, assessing and controlling risks associated with their use
- Techniques for the safe use of specialised power tools.

T8 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms
- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T9 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure.

T10 Fault conditions and symptoms related to the plant and/or equipment type encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation,

REQUIRED SKILLS AND KNOWLEDGE

supply authority regulations and or enterprise requirements pertaining to typical fault conditions and systems

- Interpretation of faults in operating mechanisms which may include drive trains and mechanical power drives, stored energy systems including hydraulic systems, pneumatic systems and mechanical storage systems, accumulators
- Interpretation of faults in electrical control systems which may include electro-mechanical relay systems, micro-processor based systems, PLC systems, integrated control systems or combinations of electrical/mechanical systems
- Types of electrical systems including AC, DC and combinations of both
- Types of fault conditions - failure to operate, failure in service and include the appropriate procedures for work on in service plant/equipment
- Types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over-pressure, under pressure, out of tolerance measurements and checks.

T11 Substation equipment components and materials related to the plant and/or equipment type encompassing:

- Types of components - complete unit of plant and/or equipment, replacement components or appropriate substitutes, their dimensions, suitability and serviceability; also the components associated with the local control systems of the equipment including indication of levels, quantities, volumes, pressures and temperatures and the operating principles of these devices and components
- Types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
- Techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present an OHS hazard to persons in the workplace

T12 Substation safety practices encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to substation safety practices
- Techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
- Requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from energised conductors
- Requirements for climbing and working at heights in substations - attached climbing principles, selection, use and operation of elevated work platforms and any OHS requirements associated with the use of EWPs
- Control of small fires - identification, selection and operation of the appropriate

REQUIRED SKILLS AND KNOWLEDGE

extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires

- Control of oil spills - identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
- Rescue and release procedures - the rescue personnel from energised conductors, emergency descent from an EWP and may include rescue from confined spaces.
- Enterprise requirements - safe access and Authorisation to Work procedures, use of mobile extendable equipment on or near energised HV conductors, emergency response procedures.
- Hazards associated with work in substations including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, dangers of near approach to energised conductors.

T13 Synchronous condenser principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Synchronous Condensers
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of Synchronous Condensers installed
- Identification of components within the Synchronous Condensers and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for Synchronous Condensers
- Techniques in evaluating serviceability of Synchronous Condensers operation
- Safety precautions when testing and measuring Synchronous Condensers - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances, communicating worksite procedures
- Operating characteristics and operational constraints including point on wave switching issues
- Ratings, cooling systems and control systems and ancillary equipment used
- Configurations and system layout including single star, double star, bridge type
- Typical protection systems used including neutral unbalance current, neutral unbalance voltage
- Techniques used when balancing elements within static reactive plant
- Safety precautions when testing and maintaining high voltage static reactive plant - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.

Evidence Guide

EVIDENCE GUIDE

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Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least one of the following:	Stator winding Rotor winding
B	All of the following;	Cooling system
C	At least one of the following;	Control system, Alarm system
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of HV power system synchronous condensers found in substations.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working:

At realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods

given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit may be demonstrated in relation to the maintenance of HV power system synchronous condensers found in substations.

Checks and measurements include cooling water resistivity, gas pressure levels, residual gas content, winding resistance, insulation resistance and control circuit functionality.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Substation Units

UETTDRSB32A Maintain power transformer on load tap changers (OLTC)

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance, repair and overhaul of substation voltage regulating equipment and is restricted to resistor and reactor type high speed on load tapchangers and does not include the main tank tap selector mechanism. It includes the inspection, recording of information, testing and measurement of associated control circuits. It also includes the range of acceptance tests required on installed complete units within the parent power transformer in accordance with established enterprise standards and procedures. It encompasses the diagnostic and pre-commissioning checks and tests involving the tapchangers and the interpretation of these results against agreed specifications.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment

Prerequisite Unit(s)	4)	
	UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDRSB25A	Maintain high voltage power and instrument transformers
	Pathway 1 - Electrician	
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low

Prerequisite Unit(s)	4)	
		voltage electrical installations
		Verify compliance and functionality of low voltage general electrical installations
	UEENEEG105A	
		Select wiring systems and cables for low voltage general electrical installations
	UEENEEG107A	
	Pathway 2 – Electrical Fitter	
		Conduct compliance and functional verification of electrical apparatus and existing circuits
	UEENEEG199A	

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to maintain voltage regulating equipment (tapchangers)	<p>1.1 Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.</p> <p>1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.</p> <p>1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.</p> <p>1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.</p> <p>1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.</p>

ELEMENT	PERFORMANCE CRITERIA
	1.8 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.
	1.9 Work site is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures.
2 Carry out the maintenance of voltage regulating equipment (tapchangers)	2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.
	2.2 CPR, Rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures.
	2.3 Safe working documentation is acquired and requirements completed in accordance with established procedures.
	2.4 Lifting, climbing and working aloft, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6 Oil circuits are isolated and tap changer vessels drained in accordance with established and environmental protection procedures.
	2.7 Tap changer is withdrawn and maintained, applying essential knowledge and associated skills and in accordance with manufacturers and enterprise procedures and recommendations.
	2.8 Pre-service tests and measurements are conducted

ELEMENT**PERFORMANCE CRITERIA**

- in accordance with enterprise procedures.
- 2.9 Essential knowledge and associated skills are applied for the safe maintenance of voltage regulating equipment (tapchangers) to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements.
- 2.10 Unplanned events or conditions are responded to in accordance with established procedures.
- 3 Complete the maintenance of voltage regulating equipment (tapchangers)
- 3.1 Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
- 3.2 Safe working documentation is surrendered and transformer made ready for service.
- 3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Required works completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining voltage regulating equipment - on load tapchangers.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB32A Power transformer on load tap changers (OLTC)

Evidence shall show an understanding of power transformer on load tap changers (OLTC) to an extent indicated by the following aspects:

T1 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T2 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

REQUIRED SKILLS AND KNOWLEDGE

T3 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

T4 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T5 Enterprises specific specialised tools encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers, phase rotation)
- Characteristics, capabilities and application of specialised tools for a particular job
- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
- Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
- Techniques in pre-use inspection on the serviceability of specialised tools
- Techniques in the selection, use, maintenance, and care and storage of specialised tools
- Identifying OHS hazards, assessing and controlling risks associated with their use
- Techniques for the safe use of specialised power tools.

T6 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T7 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure.

T8 Principles of power transformer high speed on load tap changers encompassing:

- Selector types and applications for high voltage power transformers
- Diverter switch types and applications for high voltage power transformers including live tank, dead tank, resistor type, reactor type, vacuum type, pennant flag, pennant cycle
- Ratings and construction principles
- Operating mechanism types, stored energy systems and associated control systems
- Operating principles and operating sequences of selectors and diverters
- Measurement requirements including contacts, differential wear, transition resistors and transient protection devices, rotation lag, out of sequence controls and end-of-life unit and component assessment
- Online diagnostic tools and devices
- Ancillary equipment including online filters, over pressure relays and devices
- Testing requirements including cycle timing, differential delay, energy accumulator mechanical and operational tests and control system functional tests
- Safety precautions when testing and maintaining high voltage power transformer on load tap changers - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least one of the following:	High speed resistor type and drive mechanism High speed reactor type and drive mechanism
B	At least two of the following:	Live tank diverter switch Dead tank diverter switch Tap selector
C	At least three of the following:	Insulation resistance tests Transition resistor tests Contact resistance tests Sequence timing tests Ratio checks Winding resistance tests Oil sampling
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of voltage regulating equipment (tapchangers)

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working:

At realistic heights above ground, i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit may be demonstrated in relation to high speed resistor and reactor type tapchangers installed in power transformers used in substations.

Checks and measurements may include mechanism alignment, contact erosion, component replacement, inspection and cleaning, disassembly and re-assembly, functional tests and operating mechanism checks. It includes the testing, filtering or replacement of diverter switch oil.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Substation Units

UETTDRSB33A Install high voltage plant and equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation of high voltage plant and equipment and includes the pre-commissioning tests within agreed specifications. It includes the installation of the earthing systems, tertiary cabling and/or busbar systems in accordance with enterprise procedures but does not include the associated protection systems.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

- License to practice** 3)
- Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

- Prerequisite Unit(s)** 4)

- Competencies** 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three

Prerequisite Unit(s)	4)	phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan the installation of high voltage plant and equipment	1.1 Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.

ELEMENT	PERFORMANCE CRITERIA
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.
	1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.
	1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.
	1.8 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.
	1.9 Work site is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures.
2 Carry out the installation of high voltage plant and equipment	2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.
	2.2 CPR, rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures.
	2.3 Safe working documentation is acquired and requirements completed in accordance with established procedures.
	2.4 Lifting, climbing and working aloft, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks

ELEMENT**PERFORMANCE CRITERIA**

- are reported to the immediate authorised persons for directions according to established procedures.
- 2.6 Earthing requirements are identified and installed or confirmed installed in accordance with enterprise policies and procedures.
- 2.7 Foundations and other appropriate civil works are constructed and/or confirmed ready for the erection of high voltage plant and equipment.
- 2.8 High voltage plant and equipment is erected and associated HV connections, LV controls and supplies are installed in accordance with manufacturers and enterprise procedures and recommendations.
- 2.9 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
- 2.10 Pre-commissioning checks are carried out and the high voltage plant and equipment made ready for service in accordance with established policies and procedures.
- 2.11 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
- 2.11 Essential knowledge and associated skills are applied for the safe installation of high voltage plant and equipment to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements.
- 2.13 Unplanned events or conditions are responded to in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the installation of high voltage plant and equipment	<p>3.1 Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.</p> <p>3.2 Safe working documentation is surrendered and installed power system high voltage plant and equipment made ready for service.</p> <p>3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.</p> <p>3.4 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.5 Required works completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures.</p> <p>3.6 Associated drawings, schematics and diagrams are updated to reflect work as executed in accordance with enterprise procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing HV plant and equipment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB33A High voltage plant and equipment - installation

Evidence shall show an understanding of high voltage plant and equipment - installation to an extent indicated by the following aspects:

T1 Safe working on energised low voltage equipment encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Safety precautions specific to working on or near energised low voltage conductors - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment
- Work on or near energised LV conductors - types and function of specialised tools, safe working practices when using specialised tools, methods of using specialised tools, safe procedures for work on panels and in cubicles on or near energised LV conductors, release and rescue procedures for work on or near exposed energised LV conductors.

T2 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

T3 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures,

REQUIRED SKILLS AND KNOWLEDGE

evacuation procedures

- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T4 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T5 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

T6 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T7 Enterprises specific specialised tools encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific

REQUIRED SKILLS AND KNOWLEDGE

enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers, phase rotation)

- Characteristics, capabilities and application of specialised tools for a particular job
- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
- Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
- Techniques in pre-use inspection on the serviceability of specialised tools
- Techniques in the selection, use, maintenance, and care and storage of specialised tools
- Identifying OHS hazards, assessing and controlling risks associated with their use
- Techniques for the safe use of specialised power tools.

T8 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms
- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T9 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure.

T10 Fault conditions and symptoms related to the plant and/or equipment type encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation,

REQUIRED SKILLS AND KNOWLEDGE

supply authority regulations and or enterprise requirements pertaining to typical fault conditions and systems

- Interpretation of faults in operating mechanisms which may include drive trains and mechanical power drives, stored energy systems including hydraulic systems, pneumatic systems and mechanical storage systems, accumulators
- Interpretation of faults in electrical control systems which may include electro-mechanical relay systems, micro-processor based systems, PLC systems, integrated control systems or combinations of electrical/mechanical systems
- Types of electrical systems including AC, DC and combinations of both
- Types of fault conditions - failure to operate, failure in service and include the appropriate procedures for work on in service plant/equipment
- Types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over-pressure, under pressure, out of tolerance measurements and checks.

T11 Substation equipment components and materials related to the plant and/or equipment type encompassing:

- Types of components - complete unit of plant and/or equipment, replacement components or appropriate substitutes, their dimensions, suitability and serviceability; also the components associated with the local control systems of the equipment including indication of levels, quantities, volumes, pressures and temperatures and the operating principles of these devices and components
- Types of materials - insulation, construction, fabrication or lubrication of the plant/equipment
- Techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present an OHS hazard to persons in the workplace

T12 Substation safety practices encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to substation safety practices
- Techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
- Requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from energised conductors
- Requirements for climbing and working at heights in substations - attached climbing principles, selection, use and operation of elevated work platforms and any OHS requirements associated with the use of EWPs
- Control of small fires - identification, selection and operation of the appropriate

REQUIRED SKILLS AND KNOWLEDGE

extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires

- Control of oil spills - identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
- Rescue and release procedures - the rescue personnel from energised conductors, emergency descent from an EWP and may include rescue from confined spaces.
- Enterprise requirements - safe access and Authorisation to Work procedures, use of mobile extendable equipment on or near energised HV conductors, emergency response procedures.
- Hazards associated with work in substations including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, dangers of near approach to energised conductors.

T13 Design principles of Substation LV AC and DC supply systems encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements
- Wiring conventions, systems and labelling conventions
- Substation equipment identification and layout, wiring and schematic diagrams and other appropriate diagrammatic representations
- LV design specifications, supply requirements, electrical load assessments
- Substation LV system distribution requirements - substation batteries, isolation requirements, paralleling requirements, battery chargers, DC distribution panels and control systems, AC distribution panels and control systems, auto change-over requirements,
- Control equipment and auxiliary relays, flags and alarms,
- Common panel layouts.

T14 Design principles of hydraulic and pneumatic operating mechanism principles encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, standards, supply authority regulations and or enterprise requirements
- Control system operating diagrams, including nomenclature, symbols and operating sequences, units of measurement
- Fundamentals of pressure intensification, forces and energy accumulators
- Applications for substation high voltage equipment - circuit breaker operating mechanisms, interrupter mechanisms, pumps and compressors, GIS operating mechanisms and transformer cooling systems
- Safety precautions for work on hydraulic and/or pneumatic systems - safe working practices and procedures; identification of hazards, assessment and control of OHS risks; types, selection, maintenance and use of personal protective equipment.

T15 Principles of power transformer construction and operations encompassing:

- Transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step down transformers, transmission and generation types

REQUIRED SKILLS AND KNOWLEDGE

- Reactor types - shunt and series, applications and design considerations
- Iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
- Winding configurations and construction techniques - helical, spiral, disc, interleaved disc types
- Insulation methods and techniques - fully insulated windings and graded insulation techniques, oil filled and gas filled power transformers
- Transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, impedance percent
- Nameplate details - BIL, tapping winding detail, physical layout, cooling ratings, physical details
- Transformer and reactor cooling types and their effects on design and rating
- Transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
- Winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
- Operating constraints as single units and in parallel
- Tapping windings - placement issues, tapping range, OLTC versus off load TC techniques, types in use (high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types), control system characteristics.
- High voltage bushing selection – type, insulation system used, rating, BIL, selection criteria, testing considerations.

T16 Circuit breaker operating principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to circuit breakers
- Requirements for the use of manuals, circuit breaker diagrams/plans and drawings
- Operation of protection systems and substation equipment associated with circuit breakers
- Use, characteristics and capabilities of specialised tools and equipment
- Capabilities of operating mechanisms
- Capabilities of interrupter chambers
- Enterprise Specific Policies and Procedures for the operation of circuit breakers
- Techniques in evaluating serviceability of circuit breaker operation
- Control equipment and auxiliary relays, flags and alarms
- Safety precautions when Constructing circuit breakers - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, access for operating.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least two of the following:	Power transformer High voltage reactor (series or parallel) Auxiliary transformer Current transformer Voltage transformer Capacitor bank Circuit breaker High current dc switchgear and/or equipment
B	At least two of the following:	Disconnecter Fault throwing switch Earth switch Earth grid connections Surge arrester Neutral earthing transformer Resistor bank Busbar
C	At least three of the following:	Insulation resistance tests Dielectric dissipation factor tests Low voltage excitation checks Continuity checks Ratio checks Winding resistance tests Gas pressure checks Timing checks Contact resistance checks

D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation of high voltage plant and equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working:

At realistic heights above ground, i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills

described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit may be demonstrated in relation to substation high voltage plant and equipment may include transformers and instrument transformers, auxiliary transformers, surge arrestors, wave traps, circuit breakers, capacitor banks, disconnectors, earth switches, ripples filters, static VAR compensators, gas insulated switchgear, fault throwers, resistor banks, neutral earthing transformers and reactors, high current DC switchgear and equipment.

Pre-commissioning checks and measurements may include insulation resistance, winding resistance, dielectric dissipation factor, winding ratio, vector group, low voltage excitation, continuity, trip and close checks, gas pressure checks, contact timing and other checks and measurements as required by the manufacturer.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS

RANGE STATEMENT

- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Substation Units

UETTDRSB34A Carry out surveys using thermovision techniques

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit of competence covers the thermographic inspections of transmission/distribution systems and/or substation equipment. It includes surveying, inspecting, recording of information and reporting of defective/non compliant conditions in accordance with established enterprise standards and procedures.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government

License to practice**3)**

legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits

Prerequisite Unit(s)	4)	
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	Pathway 1 - Electrician	
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	Pathway 2 – Electrical Fitter	
	UEENEEG199A	Conduct compliance and functional verification of electrical apparatus and existing circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

- | | | | |
|---|---|-----|--|
| 1 | Prepare/plan to carry out thermographic surveys | 1.1 | Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined. |
| | | 1.2 | Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites. |

ELEMENT**PERFORMANCE CRITERIA**

- | | |
|-----|--|
| 1.3 | Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures. |
| 1.4 | Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures. |
| 1.5 | Risk control measures are identified, prioritised, implemented and evaluated against the work schedule. |
| 1.6 | Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order. |
| 1.7 | Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work. |
| 1.8 | Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures. |
| 1.9 | Work site is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures. |
| 2 | Carry out thermographic surveys |
| 2.1 | OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures. |
| 2.2 | CPR, Rescue from live electrical apparatus and other related safety procedures are in place |

ELEMENT**PERFORMANCE CRITERIA**

- according to requirements and established procedures.
- 2.3 Safe working documentation is acquired if appropriate and requirements completed in accordance with established procedures.
- 2.4 Lifting, climbing and working aloft, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.
- 2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.6 Circuit load conditions are assessed, other personnel and/or organisations consulted and informed and appropriate circuit adjustments made prior to survey according to established procedures.
- 2.7 Substation equipment and/or transmission/distribution systems are surveyed and all joints, connections and components surveyed and assessed in accordance with enterprise procedures.
- 2.8 Non conformance defects are assessed for level of safety/system impact and communicated to appropriate personnel for further action as per established procedures.
- 2.9 Circuits are restored to pre-survey conditions and appropriate personnel/organisations informed as per established procedures.
- 2.10 Essential knowledge and associated skills are applied for the safe carrying out of thermographic surveys to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements.
- 2.11 Unplanned events or conditions are responded

ELEMENT**PERFORMANCE CRITERIA**

- to in accordance with established procedures.
- 3 Record the outcomes of thermographic surveys
- 3.1 Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.
- 3.2 Safe working documentation is surrendered if appropriate.
- 3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Required works completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of carrying out thermovision surveys.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB34A Thermovision techniques

Evidence shall show an understanding of thermovision techniques to an extent indicated by the following aspects:

T1 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T2 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

REQUIRED SKILLS AND KNOWLEDGE

T3 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

T4 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T5 Enterprises specific specialised tools encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised tools (voltage detectors; polarity testers, phase rotation)
- Characteristics, capabilities and application of specialised tools for a particular job
- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised tools
- Selection methods for obtaining the correct specialised tool for the particular job including during procurement, purchasing and or hiring arrangements
- Techniques in pre-use inspection on the serviceability of specialised tools
- Techniques in the selection, use, maintenance, and care and storage of specialised tools
- Identifying OHS hazards, assessing and controlling risks associated with their use
- Techniques for the safe use of specialised power tools.

T6 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T7 Enterprise Specific Data Management Processes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Data Management
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Techniques in using the Data Management systems in following necessary commands and protocols in accordance with the Enterprise Specific Procedures
- Calculation of results and data measurements using the computer
- Techniques in the preparation of preliminary works creation and closure.

T8 Fault conditions and symptoms related to the plant and/or equipment type encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to typical fault conditions and systems
- Interpretation of faults in operating mechanisms which may include drive trains and mechanical power drives, stored energy systems including hydraulic systems, pneumatic systems and mechanical storage systems, accumulators
- Interpretation of faults in electrical control systems which may include electro-mechanical relay systems, micro-processor based systems, PLC systems, integrated control systems or combinations of electrical/mechanical systems
- Types of electrical systems including AC, DC and combinations of both
- Types of fault conditions - failure to operate, failure in service and include the appropriate procedures for work on in service plant/equipment
- Types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, over-pressure, under pressure, out of tolerance measurements and checks.

T9 Substation equipment components and materials related to the plant and/or equipment type encompassing:

- Types of components - complete unit of plant and/or equipment, replacement components or appropriate substitutes, their dimensions, suitability and serviceability; also the components associated with the local control systems of the equipment including indication of levels, quantities, volumes, pressures and temperatures and the operating principles of these devices and components
- Types of materials - insulation, construction, fabrication or lubrication of the plant/equipment

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in enterprise procedures and regulatory/legislative requirements for the handling/use and storage of equipment components and materials which may present an OHS hazard to persons in the workplace

T10 Substation safety practices encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to substation safety practices
- Techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations
- Requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from energised conductors
- Requirements for climbing and working at heights in substations - attached climbing principles, selection, use and operation of elevated work platforms and any OHS requirements associated with the use of EWPs
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
- Control of oil spills - identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
- Rescue and release procedures - the rescue personnel from energised conductors, emergency descent from an EWP and may include rescue from confined spaces.
- Enterprise requirements - safe access and Authorisation to Work procedures, use of mobile extendable equipment on or near energised HV conductors, emergency response procedures.
- Hazards associated with work in substations including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, dangers of near approach to energised conductors.

T11 Design principles of high voltage insulation systems encompassing:

- Insulation design principles - common materials used, electrical characteristics, thermal characteristics, uses and applications to substation high voltage plant and equipment, grading, construction, cooling.
- Common contaminants and their effects - internal contaminants, external contaminants
- Testing and measurement of insulation quality - test types and common measuring instruments and techniques, resistance and resistivity, losses, measurement errors, temperature corrections, safe work practices related to testing and measurement
- Safety precautions when testing and measuring high voltage insulation systems - safe working practices and procedures, identification of hazards, assessment and

REQUIRED SKILLS AND KNOWLEDGE

control of OHS risks, types, selection, maintenance and use of personal protective equipment

T12 Principles of power transformer construction and operations encompassing:

- Transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step down transformers, transmission and generation types
- Reactor types - shunt and series, applications and design considerations
- Iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
- Winding configurations and construction techniques - helical, spiral, disc, interleaved disc types
- Insulation methods and techniques - fully insulated windings and graded insulation techniques, oil filled and gas filled power transformers
- Transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, impedance percent
- Nameplate details - BIL, tapping winding detail, physical layout, cooling ratings, physical details
- Transformer and reactor cooling types and their effects on design and rating
- Transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
- Winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
- Operating constraints as single units and in parallel
- Tapping windings - placement issues, tapping range, OLTC versus off load TC techniques, types in use (high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types), control system characteristics.
- High voltage bushing selection – type, insulation system used, rating, BIL, selection criteria, testing considerations

T13 Circuit breaker operating principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to circuit breakers
- Requirements for the use of manuals, circuit breaker diagrams/plans and drawings
- Operation of protection systems and substation equipment associated with circuit breakers
- Use, characteristics and capabilities of specialised tools and equipment
- Capabilities of operating mechanisms
- Capabilities of interrupter chambers
- Enterprise Specific Policies and Procedures for the operation of circuit breakers
- Techniques in evaluating serviceability of circuit breaker operation
- Control equipment and auxiliary relays, flags and alarms
- Safety precautions when Constructing circuit breakers - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types,

REQUIRED SKILLS AND KNOWLEDGE

selection, maintenance and use of personal protective equipment, responsibilities and protocols, access for operating.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered

will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least one of the following:	Transmission substation Distribution substation Traction substation Zone substation
B	At least one of the following:	Substation apparatus and equipment Transmission/distribution system conlow resistance high currents and components
C	At least three of the following:	Disconnectors Transmission/distribution system conlow resistance high currents Mid span joints Bolted palms and connections Terminations Jumpers Pot heads
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual carrying out of thermographic surveys.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working:

At realistic heights above ground, i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit may be demonstrated in relation to the thermographic surveying of distribution, transmission and rail lines and the apparatus and equipment found in and around substations.

Surveys can be carried out using hand held thermographic cameras at ground level or in a helicopter

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Commentary on recording and reporting
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Substation Units

UETTDRSB35A Maintain discrete control and protection systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the isolation, inspection, testing, adjustment, repair, refurbishment and/or overhaul and functional checks of discrete protection and control devices. It includes the requirements to prove the functionality of discrete devices such as DC supplies, overcurrent, overload, earth fault, transformer temperature controls, alarms and indication circuits.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice**3)**

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines

Prerequisite Unit(s)**4)**

UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in electromagnetic devices and related circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

UEENEEG109A Develop and connect electrical control circuits

UEENEEK142A Apply environmentally and sustainable energy procedures in the energy sector

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 – Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus

Prerequisite Unit(s) 4)

and existing circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the maintenance of discrete protection and control devices	<p>1.1 Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.</p> <p>1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.</p> <p>1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.</p> <p>1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.</p> <p>1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.</p> <p>1.8 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.</p> <p>1.9 Work site is prepared according to the work schedule and to minimise risk and damage to</p>

ELEMENT	PERFORMANCE CRITERIA
	property and personnel in accordance with established procedures.
2 Carry out the maintenance of discrete protection and control devices	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.</p> <p>2.2 CPR, Rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures.</p> <p>2.3 Safe working documentation is acquired and requirements completed in accordance with established procedures.</p> <p>2.4 Lifting, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.</p> <p>2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.6 Maintenance of discrete protection and control devices is undertaken according to requirements and established procedures.</p> <p>2.7 Data is analysed and compared with compliance specifications to ensure completion of the maintenance work is within an agreed timeframe and according to requirements.</p> <p>2.8 Essential knowledge and associated skills are applied for the safe maintenance of discrete protection and control devices to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements.</p> <p>2.9 Unplanned events or conditions are responded to in accordance with established procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
3 Complete the maintenance of discrete protection and control devices	<p>3.1 Final inspections of discrete protection and control devices are undertaken and checked against the work schedule to ensure they comply with all requirements including all required documentation.</p> <p>3.2 Anomalies between the work schedule requirements and measured performance are reported and solutions identified in accordance with established procedures.</p> <p>3.3 Safe working documentation is surrendered and transformer made ready for service.</p> <p>3.4 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.</p> <p>3.5 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.6 Required works completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining discrete protection and control devices.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB35A Discrete control and protection systems

Evidence shall show an understanding of discrete control and protection systems to an extent indicated by the following aspects:

T1 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T2 Principles of isolation and tagging procedures associated with protection testing encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
- Requirements for the use of, isolation and tagging, manuals, system diagrams/plans and drawings
- Techniques in documenting isolations
- Techniques in appropriate isolation and tagging procedures as per Commonwealth/ State/Territory legislation, supply authority regulations and enterprise standards
- Techniques in the installation and maintenance procedures protection devices as per Commonwealth/State/Territory legislation, supply authority regulations and enterprise standards

T3 Maintenance procedures associated with discrete protection schemes encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the maintenance procedures
- Requirements for the use of maintenance manuals, system diagrams/plans and drawings
- Techniques in maintenance procedures – planning, policy, testing techniques
- Close out requirements

T4 Relay manufacturer specifications encompassing:

- Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of relay manufacturer specifications

- Types, function and characteristics of specific relays - differences between

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment

instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables

Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Isolate discrete protection Control and indications Overcurrent and Earth fault relays DC Supplies Trip and control circuits Alarms and indications Function test of discrete devices
B	At least three of the following:	Neutral displacement No-volt changeover Discrete auto reclose DC Frame leakage Oil surge (site maintenance) Voltage regulation Parallel operation Thermal overloads Transformer temperature control devices CEL fail
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of discrete protection and control devices.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working:

At realistic heights above ground, i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit may be demonstrated in relation to the maintenance of discrete protection and control devices and may include the following:

Overcurrent, and Earth fault relays, Neutral displacement relays, No-volt changeover devices, Discrete auto reclose devices, DC Supplies, Oil surge devices (site maintenance), DC Frame leakage, Trip/control circuits, Alarms and indication, Voltage regulation relays, Circuit isolation (discrete only) Function tests (discrete only) Thermal overload, Transformer temperature control devices CEL fail devices.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Substation Units

UETTDRSB36A Commission discrete control and protection systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the commissioning/testing of discrete protection and control systems and includes isolation, inspection, monitoring, testing, adjustment and functional checks on systems such as over-current, overloads, earth fault, alarms and controls.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

License to practice **3)**
 Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three

Prerequisite Unit(s)	4)	
		phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDRSB25A	Maintain high voltage power and instrument transformers
	UETTDRSB29A	Maintain capacitor bank equipment for voltage regulation
	Pathway 1 - Electrician	
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical

Prerequisite Unit(s)	4)	
		installations
		Pathway 2 – Electrical Fitter
		Conduct compliance and functional verification of electrical apparatus and existing circuits
	UEENEEG199A	

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the commissioning/testing of discrete protection and control systems	1.1 Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.
	1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.
	1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.
	1.8 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.
	1.9 Work site is prepared according to the work schedule and to minimise risk and damage to

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the commissioning/testing of discrete protection and control systems	property and personnel in accordance with established procedures.
2.1	OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.
2.2	CPR, Rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures.
2.3	Safe working documentation is acquired and requirements completed in accordance with established procedures.
2.4	Lifting, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.
2.5	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
2.6	Commissioning/testing of discrete protection and control systems is undertaken according to requirements and established procedures.
2.7	Data is analysed and compared with compliance specifications to ensure commissioning/testing of the discrete system is completed within an agreed timeframe and according to requirements.
2.8	Essential knowledge and associated skills are applied for the safe commissioning/testing of discrete protection and control systems to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
2.9	Unplanned events or conditions are responded to in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the commissioning/testing of discrete protection and control systems	<p>3.1 Final inspections and functional testing of the discrete protection and control systems are completed and checked to ensure compliance with all requirements.</p> <p>3.2 Anomalies between requirements and measured performance are reported and solutions identified in accordance with established procedures.</p> <p>3.3 Safe working documentation is surrendered and discrete protection and control systems are made ready for service.</p> <p>3.4 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.</p> <p>3.5 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.6 Required works completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of commissioning/testing discrete protection and control systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB36A Discrete control and protection systems - commissioning

Evidence shall show an understanding of discrete control and protection systems - commissioning to an extent indicated by the following aspects:

T1 Commissioning procedures associated with discrete protection schemes encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures – planning, policy, testing techniques
- Close out requirements

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this

shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Isolate protection Control and alarms associated with discrete protection and control systems Isolate current transformers Calibrate discrete protection and control relays Carry out function tests (trips, alarms etc.) on discrete protection and control systems without assistance

		Write reports on the performance of discrete protection and control systems
B	At least three of the following:	Overcurrent Frame leakage Cooling controls Buchholz/surge protection Dc supplies control Neutral displacement CB reclose DC frame leakage CEL fail Earth fault
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual commissioning of discrete protection and control systems.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated

competency working:

At realistic heights above ground, i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit may be demonstrated in relation to the maintenance of discrete protection and control devices and may include the following:

Overcurrent, and Earth fault relays, Neutral displacement relays, No-volt changeover devices, Discrete auto reclose devices, DC Supplies, Oil surge devices (site maintenance), DC Frame leakage, Trip/control circuits, Alarms and indication, Voltage regulation relays, Circuit isolation (discrete only) Function tests (discrete only) Thermal overload, Transformer temperature control devices CEL fail devices.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Substation Units

UETTDRSB37A Maintain power system distribution field devices

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of ACRs, gas switches, regulators and line capacitors, communication systems including mobile phones and TMR radio. It includes secondary injection, timing, and function tests and proving correct tripping, reclosing and remote operation.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government

License to practice**3)**

legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and

Prerequisite Unit(s)	4)	
		circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	Pathway 1 - Electrician	
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	Pathway 2 – Electrical Fitter	
	UEENEEG199A	Conduct compliance and functional verification of electrical apparatus and existing circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

- | | |
|---|---|
| 1 Plan for the maintenance of distribution field devices | 1.1 Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined. |
| | 1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites. |

ELEMENT	PERFORMANCE CRITERIA
	1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.
	1.5 Risk control measures are identified, prioritised, implemented and evaluated against the work schedule.
	1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.
	1.7 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.
	1.8 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.
	1.9 Work site is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures.
2 Carry out the maintenance of distribution network field devices	2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.
	2.2 CPR, Rescue from live electrical apparatus and other related safety procedures are in place

ELEMENT	PERFORMANCE CRITERIA
	<p>according to requirements and established procedures.</p> <p>2.3 Safe working documentation is acquired and requirements completed in accordance with established procedures.</p> <p>2.4 Lifting, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.</p> <p>2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.6 Essential knowledge and associated skills are applied for the safe maintenance of distribution field devices to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.7 Maintenance, including testing of distribution field devices is undertaken according to requirements and established procedures.</p> <p>2.8 Unplanned events or conditions are responded to in accordance with established procedures.</p>
3 Complete the maintenance of distribution network field devices	<p>3.1 Functional checks of distribution field devices are completed and all work checked against the requirements to ensure compliance.</p> <p>3.2 Anomalies between the work schedule requirements and measured performance are reported and solutions identified in accordance with established procedures.</p> <p>3.3 Safe working documentation is surrendered and transformer made ready for service.</p> <p>3.4 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.</p> <p>3.5 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established</p>

ELEMENT**PERFORMANCE CRITERIA**

procedures.

- 3.6 Approved copies of the maintenance of distribution network field devices documents are issues and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining distribution field devices.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB37A Power system distribution field devices

Evidence shall show an understanding of power system distribution field devices to an extent indicated by the following aspects:

T1 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T2 Principles of isolation and tagging procedures associated with protection testing encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
- Requirements for the use of, isolation and tagging, manuals, system diagrams/plans and drawings
- Techniques in documenting isolations
- Techniques in appropriate isolation and tagging procedures as per Commonwealth/ State/Territory legislation, supply authority regulations and enterprise standards
- Techniques in the installation and maintenance procedures protection devices as per Commonwealth/State/Territory legislation, supply authority regulations and enterprise standards

T3 Maintenance procedures associated with discrete protection schemes encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the maintenance procedures
- Requirements for the use of maintenance manuals, system diagrams/plans and drawings
- Techniques in maintenance procedures – planning, policy, testing techniques
- Close out requirements

REQUIRED SKILLS AND KNOWLEDGE

T4 Relay manufacturer specifications encompassing:

- Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of relay manufacturer specifications
- Requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
- Types, function and characteristics of specific relays - differences between specific relays used for the same functionality

T5 Safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants encompassing:

- Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the handling and disposing of insulation or heat dissipation materials used in power distribution devices
- Identification of environmental issues associated with the handling and disposing of insulation materials
- Safety precautions when handling and disposing of heat dissipation materials - safe working practices, Occupational Health and Safety hazards and precautions, identification of hazards, assessing and controlling risks, types, selection, maintenance and uses of personnel protective equipment, permit to work systems and isolation procedures, types and function of specialised equipment, safe working practices when using specialised equipment, emergency response and rescue including First Aid etc.
- Techniques in the handling and disposing of insulation materials - Polychlorinated Bi-Phenyls (PCB's), asbestos, insulating Oil, SF6 gas.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following:	Assembly Functional checks Applying device settings Secondary injections Timing Remote operations
B	At least three of the following:	ACRs Gas switches Regulators Line capacitors Mobile phone systems TMR radio systems
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of distribution network field devices.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated

competency working:

At realistic heights above ground, i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit may be demonstrated in relation to the maintenance of distribution field devices. These devices may include:

Automatic circuit reclosers (ACRs), gas switches, secondary injection tests, primary injection tests, TMR radio's, SCADA, remote control, overcurrent, earth fault, sensitive earth fault, inverse time curves, definite time curves, tripping, reclose, DC supplies, AC supplies, alarms.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Substation Units

UETTDRSB38A Commission power system distribution field devices

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the commissioning of ACRs, gas switches, regulators and line capacitors, communication systems including mobile phones and TMR radio. It also includes communication with the Operating Authority, testing, clearing after test and energising using techniques that are acceptable to the Operating Authority.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice**3)**

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines

Prerequisite Unit(s)	4)	
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
	UETTDRSB37	Maintain power system distribution field devices
	Pathway 1 - Electrician	
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations

Prerequisite Unit(s) 4)

Pathway 2 – Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the commissioning of distribution field devices	<p>1.1 Work schedules including drawings, plans, requirements procedures and material lists are acquired, analysed and the extent of work determined.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.</p> <p>1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures.</p> <p>1.5 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, acquired and confirmed in safe/technical working order.</p> <p>1.6 Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work.</p> <p>1.7 Personnel participating in the work including plant operators and contractors are fully briefed, their respective responsibilities explained and coordinated and appropriate authorisation checked in accordance with established procedures.</p> <p>1.8 Work site is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the commissioning of distribution network field devices	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures.</p> <p>2.2 CPR, Rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures.</p> <p>2.3 Safe working documentation is acquired and requirements completed in accordance with established procedures.</p> <p>2.4 Lifting, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures.</p> <p>2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are monitored and preventive action taken and/or appropriate authorities consulted where necessary in accordance with established procedures.</p> <p>2.6 Commissioning, including testing of distribution field devices is undertaken according to requirements and established procedures.</p> <p>2.7 Data is analysed and compared with compliance specifications to ensure completion of the maintenance work is within an agreed timeframe and according to requirements.</p> <p>2.8 Essential knowledge and associated skills are applied for the safe commissioning of distribution network field devices to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements</p> <p>2.9 Unplanned events or conditions are responded to in accordance with established procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
3 Complete the commissioning of distribution network field devices	<p>3.1 Functional checks of distribution field devices are completed and all work checked against the requirements to ensure compliance.</p> <p>3.2 Anomalies between the work schedule requirements and measured performance are reported and solutions identified in accordance with established procedures.</p> <p>3.3 Safe working documentation is surrendered and transformer made ready for service.</p> <p>3.4 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.</p> <p>3.5 Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.6 Documents and records related to the distribution field devices are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of commissioning distribution field devices.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB38A Power system distribution field devices - commissioning

Evidence shall show an understanding of power system distribution field devices to an extent indicated by the following aspects:

T1 Commissioning procedures associated with distribution protection and control systems encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures – planning, policy, testing techniques
- Close out requirements.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this

shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Applying device settings Secondary injections Timing Remote operations Earthing checks Calibrations
B	At least three of the following:	ACRs Gas switches Regulators Line capacitors Mobile phone systems

		TMR radio systems
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual commissioning of distribution field devices

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working:

At realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills

described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit may be demonstrated in relation to the commissioning of distribution field devices. These devices may include:

Automatic circuit reclosers (ACRs), gas switches, secondary injection tests, primary injection tests, TMR radio's, SCADA, remote control, overcurrent, earth fault, sensitive earth fault, inverse time curves, definite time curves, tripping, reclose, DC supplies, AC supplies, alarms.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Substation Units

UETTDRSB39A Perform power system substation switching operation to a given schedule

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the conducting of switching operations in a substation in accordance to a given instructions, switching schedule and established enterprises procedures. It encompasses the operation of substation switching devices such as circuit breakers, air break switches, fuses, reclosers, ring main units and isolators.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice

3)

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Transmission Overhead

Distribution Overhead

Rail Traction

Distribution Cable Jointing

Electrical

Common Unit Group

Unit Code

Unit Title

UEENEEE101A

Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A

Fabricate, assemble and dismantle utilities industry components

UEENEEE104A

Solve problems in d.c. Circuits

UEENEEE105A

Fix and secure electrotechnology equipment

UEENEEE107A

Use drawings, diagrams, schedules, standards, codes and

Prerequisite Unit(s)	4)	
		specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL16A	Working safely near live electrical apparatus
	Transmission Overhead Pathway Group	
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDNIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTDNTP26A	Install transmission structures and associated hardware
	UETTDNTP27A	Maintain transmission structures and associated hardware
	UETTDNTP29A	Install and maintain transmission overhead conductors and cables
	Distribution Overhead Pathway Group	
	UETTDNDP12A	Maintain overhead energised low voltage conductors and cables
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDNIS41A	Install network infrastructure electrical equipment

Prerequisite Unit(s)

4)

UETTDRIS42A	Maintain network infrastructure electrical equipment
UETTDRIS52A	Install and maintain poles, structures and associated hardware
UETTDRIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDRIS56A	Install and maintain low voltage overhead services

Rail Traction Pathway Group

UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDRIS52A	Install and maintain poles, structures and associated hardware
UETTDRIS54A	Install and maintain poles, structures, overhead conductors and cables
UETTDRRT21A	Install traction overhead wiring systems
UETTDRRT22A	Maintain traction overhead wiring systems
UETTDRRT23A	Install rail traction bonds
UETTDRRT27A	Install overhead traction components and equipment
UETTDRRT28A	Maintain overhead traction components and equipment

Distribution Cable Jointing Pathway Group

UETTDRCJ21A	Lay ESI electrical cables
UETTDRCJ26A	Install and maintain de-energised

Prerequisite Unit(s)	4)	
		low voltage underground polymeric cables.
	UETTDRCJ27A	Install and maintain de-energised high voltage underground polymeric cables.
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDRLS41A	Install network infrastructure electrical equipment
	UETTDRLS42A	Maintain network infrastructure electrical equipment
	UETTDRLS55A	Install and maintain low voltage underground services
	Electrical Pathway Group	
	UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical

Prerequisite Unit(s) 4)

control circuits

UEENEEK142A Apply environmentally and sustainable energy procedures in the energy sector

UETTDRIS67A Solve problems in energy supply network equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for substation switching to a given schedule	<p>1.1 Switching and work schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for substation switching are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant authority is obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p> <p>1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements</p> <p>1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.</p>

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|--|---|
| | 1.10 | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures. |
| | 1.11 | Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures. |
| | 1.12 | Road signs, barriers and warning devices are positioned in accordance with requirements. |
| 2 | Carry out substation switching to a given schedule | |
| | 2.1 | OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures. |
| | 2.2 | Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed. |
| | 2.3 | Essential knowledge and associated skills are applied in safe substation switching to a given schedule to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements |
| | 2.4 | Communications with Switching Control Officer are established and maintained throughout the isolation operation according to established procedures. |
| | 2.5 | Electrical equipment and associated circuits line/network or work site to be switched is isolated and proved de-energised using appropriate devices, earthed where required and load transfer successfully achieved according to requirements and established procedures. |
| | 2.6 | Substation switching to a given schedule is carried out, in accordance with the work schedule and requirements/established procedures. |

ELEMENT	PERFORMANCE CRITERIA
	2.7 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.8 Unplanned events occurring during substation switching to a given schedule are responded to and undertaken within the scope of established procedures.
	2.9 Relevant permits are prepared and issued in accordance with established procedures.
	2.10 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.11 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete substation switching to a given schedule	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant permit(s) are signed off, safety devices are removed, and the system is re-energised and returned to service in accordance with requirements/established procedures.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel and authority notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of performing substation switching to a given schedule.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSB39A Power system substation switching operation

Evidence shall show an understanding of power system substation switching operation to an extent indicated by the following aspects:

T1 Installation of switchgear and associated equipment encompassing:

- Types and function of various switchgear - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches, circuit breakers, operating characteristics, advantages and disadvantages of different types switchgear, installation procedures, earthing, requirements and techniques
- Types of equipment - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- Installation procedures for switchgear and equipment - standards, codes, legislation, supply authority regulations and or enterprise requirements, assembly and erecting procedures, earthing requirements and techniques, pole mounted locations
- Maintenance procedures for switchgear and equipment - diagnosing and rectifying faults according to electricity supply industry standards and procedures,
- Testing and commissioning - electricity supply industry standards and procedures.

T2 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

T3 High voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and

REQUIRED SKILLS AND KNOWLEDGE

capabilities of specialised tools and testing equipment, network interconnectors
source of possible backfeed

- Role of the HV switching operator
- Operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- Types and categories of HV switchgear
- Application, function and operating capabilities of switchgear
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV transmission main and working earths
- Earthing HV electrical apparatus practices and procedures for access - purposes of “Operational” and additional work part “on-site” earths, factors determining the location and effectiveness of “Operational” earthing, acceptable industry procedures, personal protective equipment, high voltage switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T4 High voltage fault switching principles encompassing:

- Primary causes, effects and types of HV electrical faults
- HV protection devices - main components, types, categories, applications, functions.
- Basic principle of operation of HV system protection devices
- Protection co-ordination and protection “zoning”
- HV feeder auto-reclosing suppression – function, application
- Circuit condition requirements and switching considerations when paralleling and separating HV feeders.

T5 High voltage distribution transformer principles encompassing:

- Operation of HV distribution transformers - principle governing factors for transformer ratings, protection and alarms, operating limitations and the relationship between transformer and HV fuse rating, purpose and principle operation of HV distribution transformer tap changers, HV distribution transformer and transformer — cable combination switching practices, paralleling requirements, isolation and earthing procedures for access, common distribution transformer and associated electrical apparatus faults.
- HV underground switching equipment - arc stranglers, switch operation, load break elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers

T6 High voltage SWER system encompassing:

- Application and function of SWER system components

REQUIRED SKILLS AND KNOWLEDGE

- Circuit arrangement
- Principle of operation
- Hazards and procedures associated with faulty SWER earth systems
- Procedure to isolate, energise and commission SWER substations

T7 Feeder automation system encompassing:

- Function of feeder automation system and the main components
- Operation procedure for a remote field device from a local control station
- Functions of “System Control and Data Acquisition” (SCADA) (or any other relevant Data Acquisition and Control) systems and its main components
- SCADA system security interlocks and access restrictions
- SCADA system operation when switching apparatus or retrieving data via a remote access device such as; Remote Access Terminal (RAT), Dial Up Voice Annunciated System and Local Control Station
- Function of the main components of a local/remote control system
- Operation of a field devices using SCADA systems via a Remote Access Terminal (RAT), Dial Up Annunciated System and Local Control Station.

T8 HV overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to HV overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment.
- Role and responsibilities of the HV switching operator
- Operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc strangles.
- HV switchgear – types, categories, application, operating capabilities.
- Operation of HV overhead switching or indicating devices - fuses; disconnect fuses; load switching; live line indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing sticks; phasing tester
- Operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing; HV switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks

REQUIRED SKILLS AND KNOWLEDGE

associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered

will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Approvals/clearances Access permits
B	All of the following:	Operating sticks Operating earths Voltage detectors
C	All of the following:	Phasing equipment Ground equipment isolating handles and earths
D	Any one of the following:	Links Air break switches Fuses
E	Any two of the following:	Reclosers Ring main units Circuit breakers
F	At least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual substation switching to a given schedule.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the carrying out of switching operations in a substation in accordance to a given instructions and switching schedule.

Switchgear includes ring main units, circuit breakers, isolators, earth switches, HV links, air break switches, capacitor banks, reactor banks, line/wave traps and fuses. (Refer to Definition 25)

Specialist tools include HV phasing sticks, HV link sticks, HV live-line clamp operating sticks, HV ground transformer isolating handles and associated earths, HV overhead operating earths and HV detectors.

Switching program/schedule including necessary detail, e.g. structure, switch or equipment number; locations; HV feeder; outage times; works plan/order.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect

RANGE STATEMENT

- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Industry Specific Cross-Discipline Units

UETTDRSO32A Manage power systems network faults

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the management of single incident faults on electrical network plant to ensure prompt restoration of supply to affected customers. Electrical network plant includes feeders, transformers and busbars from transmission to distribution voltages. The unit includes single incident faults ranging from simple (involving a single item and no loss of supply) to complex (involving multiple substations with extensive loss of supply). The unit also encompasses liaison with operating authorities and dispatching and managing field crews, as well as the monitoring of safe access to the network.

Application of the Unit

Application of the Unit 2)

This Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice**3)**

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for

Prerequisite Unit(s)	4)	problems in complex multiple path circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTD RSO41A	Manage power systems transmission networks
	UETTD RSO48A	Respond to discrete and interdependent protection operations
	UETTD RSO49A	Coordinate power system operations in a regulated energy market
	UETTD RSO50A	Respond to complex power system protection operations
	Generation/Distribution and Subtransmission Pathway Unit Group	
	UETTD RSO34A	Control power systems generating plant

Prerequisite Unit(s) 4)

UETTDRSO37A Develop high voltage distribution and subtransmission switching programs

UETTDRSO40A Coordinate high voltage distribution and subtransmission networks

Generation/Transmission Pathway Unit Group

UETTDRSO34A Control power systems generating plant

UETTDRSO38A Develop and evaluate power systems transmission switching programs

UETTDRSO47A Coordinate high voltage transmission network

Distribution and Subtransmission Pathway Unit Group

UETTDRSO35A Manage high voltage distribution and subtransmission network demand

UETTDRSO37A Develop high voltage distribution and subtransmission switching programs

UETTDRSO40A Coordinate high voltage distribution and subtransmission networks

Transmission Pathway Unit Group

UETTDRSO38A Develop and evaluate power systems transmission switching programs

UETTDRSO41A Manage power systems transmission networks

UETTDRSO42A Manage power systems transmission network demand

UETTDRSO47A Coordinate high voltage transmission network

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the

following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the management of a network fault	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the management of network faults, are reviewed and determined.
		1.2	Purpose of the management is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the management of network faults are obtained or established with the appropriate personnel.

ELEMENT	PERFORMANCE CRITERIA
	1.4 Identification and testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the occurrence of a network fault.
	1.5 Testing parameters are established from organisational established procedures on policies and specifications.
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.12 Action plan is developed as per requirements and established procedures.
2 Carry out the management of a network fault	2.1 Action plan is initiated and continually monitored to ensure outcomes are being met.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the network fault solution in accordance with requirements and/or established procedures.
	2.3 Network fault management decisions are made on the basis of safety and effective outcomes

ELEMENT	PERFORMANCE CRITERIA
	according to requirements and/or established procedures.
2.4	Stakeholders/customers are kept informed of current status regarding plan progress and recent developments.
2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
2.7	Testing of network fault management procedures is undertaken according to requirements and established procedures.
2.8	Work teams/groups are arranged, coordinated and evaluated to ensure planned goals are met according to established procedures.
2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
2.11	Strategic plans are developed incorporating organisation initiatives as per established procedures.
3 Complete the management of a network fault	3.1 Final inspection of the network is undertaken to ensure it complies with all requirements and report includes all specifications and documentations needed to complete the project.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are

ELEMENT**PERFORMANCE CRITERIA**

finalised/commissioned.

- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of network fault management documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of managing network faults.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO32A Power systems network faults

Evidence shall show an understanding of power systems network faults to an extent indicated by the following aspects: Manage power systems network faults

T1 Enterprise specific procedures and work practices relating to fault restorations encompassing

- Commonwealth, State/Territory and local government legislation, supply authority regulations, Standards, codes, and or enterprise requirements applicable to the procedures and work practices relating to fault restorations
- Requirements for the use of operational manuals, system diagrams/plans and drawings
- Identify and interpret enterprise operating procedures
- Techniques in the applying enterprise operating procedures

T2 Use of fault information to analyse and develop optimal network restoration strategies encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the analysis of protection targeting
- Requirements for the use of operational manuals, system diagrams/plans and drawings
- Techniques in the collation of protection data
- Techniques in the analyse and assessment of fault information – public, employee, protection equipment.
- Application methods of fault information to analyse and develop optimal network restoration strategies - public and employee safety, enterprise reliability guidelines.
- resource availability.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Manage a Network Fault including all of the following:	<p>Identify a network fault by interpreting available alarms and event data.</p> <p>Develop a plan to enable management of a network fault.</p> <p>Implement plans in order that the network be restored after a fault has occurred.</p> <p>Effectively liaise with operating authorities and field crews to restore the network after a fault has occurred.</p> <p>Document/de-brief actions upon restoration of the network.</p>
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to undertake actual management of a network fault.

Note:

Access will be needed to: relevant modelling tools, drawings, computerised electrical plant control and monitoring facilities and enterprise operational policies, procedures and work practices.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the management of network fault operations such as simultaneous multiple network faults and shall be demonstrated using the following:

Equipment includes; sectionalisers, security, sensitive earth fault protection, communication bearers, local trip circuits, inter-trip circuits, remote control supervisory circuits, frequency injection units, under frequency circuits, voice frequency protection signalling, micro-controllers, RDC and MUX units, pilot cables, telephone lines, microwave bearers, cossonay earthwire carriers and optical fibre cables.

Equipment also includes; LV fuses, links and bridges, HV links, fuses, reclosers, ring main units, circuit breakers, isolators, earth switches, sectionalisers, air break switches, capacitor banks, transformer taps, metering and protection equipment, data communication systems. Primary and secondary voltage and current injection equipment; time delay measuring equipment; current transformers; voltage transformers; power transformers; tapchangers; circuit breakers; capacitor banks; ring main units; audio frequency load control; circuit breaker auxiliary systems; substation and metal structure earthing systems; SCADA interfaces and transducer inputs; local opto-isolated alarms; PLC programs; auto reclosers (ACRS); protection relays; metering; control circuits; statistical metering systems; frame leakage relays; distance relays; pilot wire relays; transformer differential relays; busbar differential relays; impedance bus zone relays; overcurrent and earth fault relays; transformer neutral check relays; circuit breaker fail relays; multi-trip relays; auto recloser relays; voltage transformer failure relays; surge protection relays; buchholz relays; winding temperature relays; sensitive earth fault relays; phase failure relays; frequency relays; load shedding relays; general protection LV devices; oil temperature protection devices; oil surge protection devices; power supplies. differential relays; power systems; multi-faceted schemes; interactive overload schemes, distance protection (incorporating relay selection, switched/non-switched schemes; mutual coupling and teed feeder systems); protection signalling (incorporating series, direct, permissive, distance acceleration, block interruption); telecommunication circuits and equipment ; alternators; generator differential protection; over/under speed protection; over/under flux protection; synchrosopes; excitation circuits; governors.

Communication equipment may include: Fixed radio; mobile radio; satellite; SACS controllers; computer hardware and software; programmable controllers; modems; digital line drivers (low and high speed); fibre optic line drivers (low and high speed); radio links including voice link and digital bearer; wave trap.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

RANGE STATEMENT

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation.
- Environmental management documentation.
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

System Operation Units

UETTDRSO33A Manage power systems critical events

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the management of critical events such as simultaneous multiple network faults, and storm events of various magnitudes. It includes liaison procedures with multiple operating authorities and dispatching and managing multiple field crews. It also encompasses monitoring of safe access to the network and invoking crisis management procedures and mutual aid plans.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice**3)**

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems

Prerequisite Unit(s)	4)	
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRSO32A	Manage power systems network faults
	UETTDRSO41A	Manage power systems transmission networks
	UETTDRSO48A	Respond to discrete and interdependent protection operations
	UETTDRSO49A	Coordinate power system operations in a regulated energy market
	UETTDRSO50A	Respond to complex power system protection operations
	Generation/Distribution and Subtransmission Pathway Unit Group	
	UETTDRSO34A	Control power systems generating

Prerequisite Unit(s)	4)	
		plant
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs
	UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks
	Generation/Transmission Pathway Unit Group	
	UETTDRSO34A	Control power systems generating plant
	UETTDRSO38A	Develop and evaluate power systems transmission switching programs
	UETTDRSO47A	Coordinate high voltage transmission network
	Distribution and Subtransmission Pathway Unit Group	
	UETTDRSO35A	Manage high voltage distribution and subtransmission network demand
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs
	UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks
	Transmission Pathway Unit Group	
	UETTDRSO38A	Develop and evaluate power systems transmission switching programs
	UETTDRSO41A	Manage power systems transmission networks
	UETTDRSO42A	Manage power systems transmission network demand
	UETTDRSO47A	Coordinate high voltage transmission network

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Plan for the management of a critical event	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the management of critical events, are reviewed and determined.
		1.2	Purpose of the management is established after data is analysed and expected outcomes of the work are confirmed with the appropriate

ELEMENT	PERFORMANCE CRITERIA
	personnel.
	1.3 Organisational established procedures on policies and specifications for the management of events are obtained or established with the appropriate personnel.
	1.4 Identification and testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the occurrence of a critical event.
	1.5 Testing parameters are established from organisational established procedures on policies and specifications.
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.12 Action plan is developed.
2 Carry out the management of a critical event	2.1 Action plan is initiated and continually monitored to ensure outcomes are being met.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated

ELEMENT**PERFORMANCE CRITERIA**

- into the network fault solution in accordance with requirements and/or established procedures.
- 2.3 Network fault management decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
- 2.4 Stakeholders/customers are kept informed of current status regarding plan progress and recent developments.
- 2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing of critical event management procedures is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the management of a critical event	<p>3.1 Strategic plans are developed incorporating organisation initiatives as per established procedures.</p> <p>3.2 Final review of the management procedures of the critical event are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.</p> <p>3.3 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.</p> <p>3.4 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.5 Approved copies of critical event management documents are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of managing critical events.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO33A Power systems critical events

Evidence shall show an understanding of power systems critical events to an extent indicated by the following aspects:

T1 Enterprise specific procedures and work practices relating to critical events encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the procedures and work practices relating to critical events
- Requirements for the use of operational manuals, system diagrams/plans and drawings
- Identify and interpret enterprise operating procedures
- Techniques in the applying enterprise operating procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for

apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Manage a Critical Event within including all of the following:	<p>Identify a critical event.</p> <p>Develop a plan to enable management of a critical event.</p> <p>Implement plans in order that the network be restored after the critical event has occurred.</p> <p>Effectively liaise with operating authorities and field crews to restore the network after a critical event has occurred.</p> <p>Document/De-brief actions upon</p>

		restoration of the network.
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual for management of a critical event.

Note:

Access will be needed to: relevant protection, control, metering, and alarm equipment, network drawings, computerised electrical plant control and monitoring facilities, operational event data, enterprise operational policies, procedures and work practices and enterprise crisis management procedures.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction

Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the management of critical event operations such as simultaneous multiple network faults and storm events of various magnitudes and shall be demonstrated using the following:

Equipment includes; sectionalisers, security, sensitive earth fault protection, communication bearers, local trip circuits, inter-trip circuits, remote control supervisory circuits, frequency injection units, under frequency circuits, voice frequency protection signalling, micro-controllers, RDC and MUX units, pilot cables, telephone lines, microwave bearers, cossonay earthwire carriers and optical fibre cables.

Equipment also includes; LV fuses, links and bridges, HV links, fuses, reclosers, ring main units, circuit breakers, isolators, earth switches, sectionalisers, air break switches, capacitor banks, transformer taps, metering and protection equipment, data communication systems. Primary and secondary voltage and current injection equipment; time delay measuring equipment; current transformers; voltage transformers; power transformers; tapchangers; circuit breakers; capacitor banks; ring main units; audio frequency load control; circuit breaker auxiliary systems; substation and metal structure earthing systems; SCADA interfaces and transducer inputs; local opto-isolated alarms; PLC programs; auto reclosers (ACRS); protection relays; metering; control circuits; statistical metering systems; frame leakage relays; distance relays; pilot wire relays; transformer differential relays; busbar differential relays; impedance bus zone relays; overcurrent and earth fault relays; transformer neutral check relays; circuit breaker fail relays; multi-trip relays; auto recloser relays; voltage transformer failure relays; surge protection relays; buchholz relays; winding temperature relays; sensitive earth fault relays; phase failure relays; frequency relays; load shedding relays; general protection LV devices; oil temperature protection devices; oil surge protection devices; power supplies. differential relays; power systems; multi-faceted schemes; interactive overload schemes, distance protection (incorporating relay selection, switched/non-switched schemes; mutual coupling and teed feeder systems); protection signalling (incorporating series, direct, permissive, distance acceleration, block interruption); telecommunication circuits and equipment; alternators; generator differential protection; over/under speed protection; over/under flux protection; synchrosopes; excitation circuits; governors.

Communication equipment may include: Fixed radio; mobile radio; satellite; sags controllers; computer hardware and software; programmable controllers; modems; digital line drivers (low and high speed); fibre optic line drivers (low and high speed); radio links including voice link and digital bearer; wave trap.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

RANGE STATEMENT

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

System Operation Units

UETTDRSO34A Control power systems generating plant

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the control of the generation side of a generation plants. It includes the assessment, evaluation and achievement of the synchronization requirements to ensure machine and or system stability during synchronisation. It also includes the control of the generation of electrical energy, the coordination of the generation control and the monitoring of the system/plant. It also encompasses the analysis of the system/plant faults, the updating of the relevant documentation and the reporting of plant problems, movements, abnormalities and status in accordance with enterprise/site procedures.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice**3)**

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report

Prerequisite Unit(s)	4)	
	UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRSO48A	Respond to discrete and interdependent protection operations
	UETTDRSO49A	Coordinate power system operations in a regulated energy market
	Distribution and Subtransmission Pathway Unit Group	
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs
	UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks
	Transmission Pathway Unit Group	

Prerequisite Unit(s) 4)

UETTDRSO38A	Develop and evaluate power systems transmission switching programs
UETTDRSO47A	Coordinate high voltage transmission network

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading	5	Writing	5	Numeracy	5
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Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the control of a generation plant	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the control of the generating plant, are reviewed and determined.
	1.2 Purpose of the control is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Organisational established procedures on policies and specifications for the control of the generating plant are obtained or established with the appropriate personnel.
	1.4 Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
	1.5 Testing parameters are established from organisational established procedures on policies and specifications.
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the control of a generation plant	<p>2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.</p> <p>2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.</p> <p>2.3 Decisions for the control of the generating plant are made on the basis of safety and effective outcomes according to requirements and/or established procedures.</p> <p>2.4 Mathematical and/or engineering models of the control procedures are used to analyse the effectiveness of the finished project as per requirements and established procedures.</p> <p>2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.</p> <p>2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.</p> <p>2.7 Testing of control procedures is undertaken according to requirements and established procedures.</p> <p>2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.</p> <p>2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.</p> <p>2.10 Quality of work is monitored against personal</p>

ELEMENT	PERFORMANCE CRITERIA
	performance agreement and/or established organisational and professional standards.
	2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
3 Complete the control of a generation plant	3.1 Final review of the control procedures of the generating plant are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
	3.4 Approved copies of the documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of controlling generating plant.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO34A Power systems generating plant control

Evidence shall show an understanding of power systems generating plant control to an extent indicated by the following aspects:

T1 Enterprise specific procedures and work practices relating to generating plant encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to the procedures and work practices relating to generating plant
- Requirements for the use of operational manuals, system diagrams/plans and drawings
- Identify and interpret enterprise operating procedures
- Techniques in the applying enterprise operating procedures.

T2 Voltage control techniques encompassing:

- Conditions leading to voltage collapse
- Effects on system of high and low voltage
- Voltage control devices - voltage regulators applied to generators and synchronous phase modifiers, electromagnetic voltage regulators, series and parallel capacitors, OLTC transformers and static VAR compensators (SVC's). SVC's includes saturated reactor compensators; thyristor controlled reactor compensators and combined systems
- Production of harmonics and methods of harmonic control
- Location of voltage control devices within the system.

T3 Power flow control encompassing:

- Use of system components to control power flow patterns - base load, spinning reserve, regulating machines, rapid start plant, phase shifting transformers and load shedding
- Principles of automated control
- Synchronising power
- Relationship of power and frequency
- Machine stabilisation techniques
- System oscillations and stability - damped and undamped oscillation, relationship of fault clearance times and system stability, critical clearance times.

REQUIRED SKILLS AND KNOWLEDGE

T4 Alternators operation and control encompassing:

- Constructional features of alternators - weights, lengths, lengths, cooling mediums, cooling systems, prime mover types, prime mover attachment, types of windings, core arrangements
- Principle of operation - induction machines, synchronous machines
- Modes of operation - island and infinite bus operation, running up of prime movers, loading the alternator, requirements for synchronising, methods of synchronising
- Use of reactive capability diagram - related diagram types, current circle diagram, performance chart, capability diagram, values represented, per unit representation, limits representation and meaning
- Automatic voltage regulators - need for voltage control, required attributes of an AVR, range, response time, constraints on AVR capability, desirable attributes of an AVR, power consumption, compensation, rotor stabilisation, automatic changeover systems, input and output requirements and components
- Operation on an infinite bus - definition of infinite bus, power/angle dependence, reactive flow/voltage dependence, power/angle diagram, effect of saliency, transient conditions, practical and theoretical stability limits, voltage dependence of stability, control of reactive flow using AVR and generator transformer tap changer.

T5 Prime mover principles encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations, Standards, codes, and or enterprise requirements applicable to the prime movers
- Requirements for the use of operational manuals, system diagrams/plans and drawings
- Types, characterizes and applications of energy sources and conversion systems – wind, steam turbine, gas turbine, diesel.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the Essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Manage an Electricity Generating Plant including all of the following:	<p>Operate generator and excitation systems.</p> <p>Control and coordinate generation of electrical energy.</p> <p>Analyse prime mover and alternator faults.</p> <p>Effectively liaise with operating and regulatory authorities.</p> <p>Record events using both written and computerised logging systems.</p> <p>Document/De-brief actions following an event resulting in loss of generation.</p>
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual control of a generation plant.

Note:

Access will be needed to: relevant protection, control, metering, and alarm equipment, network drawings, computerised electrical plant control and monitoring facilities, operational event data, enterprise operational policies, procedures and work practices and enterprise crisis management procedures.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to controlling the generation side of generation plants and shall be demonstrated using the following:

Key indicators may include frequency time error, bus voltage, machine/ equipment voltage and current limits, plant temperatures, reactive power flows, power factor, generation plant load capabilities, protection settings, visual and audible indicators, analogue and digital displays and load shedding requirements

Systems, plant and equipment may include generator cooling systems; fuel delivery system; generator and generator auxiliary plant; generator excitation system; generation fire protection system; unit coordinated control system; generator circuit breaker/transformer; unit auxiliary switchboards; electricity market auto loading procedures prime mover governing system; alternators; generator differential protection; over/under speed protection; over/under flux protection; synchrosopes; excitation circuits.

Technical and operational indicators may include stimuli (audio, smell, touch, visual), remote or local indicators and recorders, computers and alarms (visible and or audible)

Operating within an isolated system the environment may be remote from plant and equipment being operated; (operation is assisted by remote indicators of plant status and other parameters monitored); during night periods; during inclement or otherwise harsh weather conditions; and in wet/noisy/dusty areas.

Unit operations (systems requirements) may include spurious faults in automatic systems operating out of range, failure of automatic system components and routine plant movement

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information

RANGE STATEMENT

- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

System Operation Units

UETTDRSO35A Manage high voltage distribution and subtransmission network demand

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the management of the switching of HV network components with due regard to the loadings and prevailing network constraints and may include scheduling of generators, VAR compensators, load shedding and non-essential loads in response to NEMMCO or network requirements. It also includes voltage control equipment.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice

3)

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems

Prerequisite Unit(s)	4)	
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRSO48A	Respond to discrete and interdependent protection operations
	UETTDRSO49A	Coordinate power system operations in a regulated energy market
	Distribution and Subtransmission Pathway Unit Group	
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs
	UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks
	Transmission Pathway Unit Group	
	UETTDRSO38A	Develop and evaluate power systems transmission switching programs

Prerequisite Unit(s) 4)

UETTDRSO47A Coordinate high voltage transmission network

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the management of HV Distribution and Sub transmission network demand	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the management of HV Distribution and Sub transmission network systems, are reviewed and determined.
	1.2 Purpose of the management is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Organisational established procedures on policies and specifications for the management of the network demand are obtained or established with the appropriate personnel.
	1.4 Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
	1.5 Testing parameters are established from organisational established procedures on policies and specifications.
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the management of HV Distribution and Sub transmission network demand	requirements and/or established procedures.
2.1	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
2.2	OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
2.3	Management of HV Distribution and Sub transmission network demand decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
2.4	Mathematical models of the HV Distribution and Sub transmission network demand are used to analyse the effectiveness of the finished project as per requirements and established procedures.
2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
2.7	Testing of HV Distribution and Sub transmission network demand is undertaken according to requirements and established procedures.
2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
2.9	Solutions to non-routine problems are identified and actioned, using acquired essential

ELEMENT	PERFORMANCE CRITERIA
	knowledge and associated skills, according to requirements.
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
	2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
3 Complete the management of HV Distribution and Sub transmission network demand	3.1 Final inspections of the network demand are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
	3.4 Approved copies of the managed HV distribution and Sub transmission network demand documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of managing HV distribution and sub transmission network demand.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO35A High voltage distribution and subtransmission network demand

Evidence shall show an understanding of high voltage distribution and subtransmission network demand to an extent indicated by the following aspects:

T1 Enterprise specific procedures and work practices relating to managing network demand encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the procedures and work practices relating to managing network demand
- Requirements for the use of demand management manuals, system diagrams/plans and drawings
- Identify and interpret enterprise demand management procedures
- Techniques in the applying enterprise demand management procedures.

T2 Effective management and communication encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to assisting in effective management and communication
- Enterprise operational principles - workplace OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures, anti-discrimination policies and procedures.
- Relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to OHS training, methods of addressing barriers such as literacy and cultural differences and provisions relating to OHS issue resolution
- Techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management, range of support services and expertise available.
- Techniques in managing relationships - identifying problems, methods of conflict resolution, methods of consultation, communication, negotiation and mentoring, strategies for positive feedback.
- Techniques in leadership in achieving enterprise strategic and operational plans
- Techniques in managing relationships under stress - stress management.

T3 Methodology used in writing enterprise specific management reports

REQUIRED SKILLS AND KNOWLEDGE

encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the writing enterprise specific management reports
- Techniques in researching, collating and analysing information for the report - recording, filing, retrieving systems, storing and retrieving data from computer systems.
- Relationship of management reports to enterprise policies and procedures - enterprise structure and resources, workplace OHS and risk management enterprise data, financial and operational data, environmental enterprise policies and procedures, industrial relations policies and procedures, anti-discrimination policies and procedures.
- Techniques in writing enterprise specific management reports - methods used to disseminate information and facilitate enterprise requirements, document proformas and compliance and legislative requirements to produce effective reports in the appropriate format.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord

with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as

- specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Demonstrate at least three (3) system manipulations that encompass the following:	HV Sub transmission distribution network Transmission network manipulation to control loading on equipment Transformers with HV windings HV Busbars HV Isolators HV Switchgear (applicable to enterprise equipment)
B	Do all of the following:	Manage multiple switching instructions Coordinate the status of access permits/authorities on HV network equipment Ensure network plant operates within design

		<p>and regulatory requirements on a real time basis</p> <p>Calculation of line loading</p> <p>Preparation and authorisation of HV distribution switching programs</p> <p>Demonstrate application of SCADA or equivalent.</p> <p>Analysis, diagnosis and reporting of system failure</p> <p>Calculation and analysis of paralleling conditions on the interconnected HV system as applicable to the entity</p>
C	<p>Prepare, write and check switching sheets to undertake all of the following:</p>	<p>Manage load</p> <p>Manage Voltage</p> <p>Minimise loss</p> <p>Maximise system reliability</p> <p>Allow safe network access for maintenance activities</p> <p>Allow safe network access for construction activities</p> <p>Validating fault reports arising from system disturbances</p>
D	<p>At least one occasion</p>	<p>Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated</p>

		in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual management of HV Distribution and Sub transmission network demand

Note:

Access will be needed to: relevant protection, control, metering, and alarm equipment, network drawings, computerised electrical plant control and monitoring facilities, operational event data, enterprise operational policies, procedures and work practices and enterprise crisis management procedures.

In addition to the resources listed above in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the management of a HV components with due regard to the loadings and prevailing network and shall be demonstrated using the following:

HV Distribution feeders/distribution network; transformers or regulators with HV windings; HV busbars; HV isolators; HV Switchgear (applicable to enterprise equipment); switching instructions (applicable to enterprise equipment); computers (applicable to enterprise equipment); network diagrams (applicable to enterprise equipment)

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 System Operation Units

UETTDRSO36A Develop low voltage distribution switching programs

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the preparation and/or checking of activities required to place the LV distribution network in a state in which work can safely be performed whilst minimising customer outages. The format is typically a written sequence of switching items in a pre-defined format. It includes planning outages and taking into account loading of network components. It also includes planning the management of multiple outages on the LV distribution network and the calculation of network loading conditions to ensure the network is operating within designed parameters.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice**3)**

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report

Prerequisite Unit(s)	4)	
	UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Plan for the preparation of LV Distribution switching programs	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of LV Distribution switching systems, are reviewed and determined.
		1.2	Purpose of the switching program preparation is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the LV Distribution Switching systems are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Testing parameters are established from organisational established procedures on policies and specifications.

ELEMENT	PERFORMANCE CRITERIA
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the preparation of LV Distribution switching programs	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3 LV Distribution switching program decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4 Mathematical and/or engineering models of the LV Switching systems are used to analyse the effectiveness of the finished project as per requirements and established procedures.
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be

ELEMENT**PERFORMANCE CRITERIA**

		undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7	Testing of LV switching program is undertaken according to requirements and established procedures.
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
	2.11	Strategic plans are developed incorporating organisation initiatives as per established procedures.
3	Complete the preparation of LV Distribution switching programs	<p>3.1 Final review of the switching program is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of the preparation of LV Distribution Switching programs documents are</p>

ELEMENT

PERFORMANCE CRITERIA

issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing LV distribution switching programs.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO36A Low voltage distribution switching programs

Evidence shall show an understanding of low voltage distribution switching programs to an extent indicated by the following aspects:

T1 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations.

T2 Control of generator systems for synchronisation of a LV genset encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the operation of a portable generator encompassing:
- Safety precautions specific to the synchronisation of gensets - safe working practices and procedures, synchronising procedures
- Techniques in the installation of gensets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of LV load, assessing the appropriateness of the generator.
- Operating a generator in parallel to a single LV job - overhead systems, indoor systems, customer installations, kiosk substations

LV genset and control system to LV Distribution assets.

T3 Different types and function of distribution components encompassing:

- Commonwealth/State/Territory and local government legislation, Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of distribution components

REQUIRED SKILLS AND KNOWLEDGE

- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
- Types, function and characteristics of distribution components
- Safety policies and procedures precautions related to the handling and installing distribution components

T4 Co-ordinating access authority procedures encompassing:

- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and co-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
- Techniques in facilitating and co-ordinating the delivery and issuing of access authorities
- Techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific work site, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, regulatory requirements such as Occupational Health and Safety and electrical safety
- Techniques in the receiving and co-ordinating the cancellation of access authorities in readiness for restoration
- Methods of conducting audits on correct access authority procedures
- Process of issuing of other access authorities for work permits - working in confined space, if required, co-ordination of access authorities, engaging and briefing contractors on electrical and other work
- Issue and receipt of operating agreements.

T5 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T6 Principles of isolation and tagging procedures associated with protection testing encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures

REQUIRED SKILLS AND KNOWLEDGE

- Requirements for the use of, isolation and tagging, manuals, system diagrams/plans and drawings
- Techniques in documenting isolations
- Techniques in appropriate isolation and tagging procedures as per Commonwealth /State /Territory legislation, supply authority regulations and enterprise standards
- Techniques in the installation and maintenance procedures protection devices as per Commonwealth/State/Territory legislation, supply authority regulations and enterprise standards.

T7 Low voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of low voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, LV network interconnectors source of possible backfeed
- Low voltage switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
- Personnel protective equipment (PPE) for LV switching

T8 LV system switching principles including switching authorisation procedures encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of LV systems and equipment to be switched
- Procedures for obtaining correct LV switching authorization - identification of OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching, procedures for coordination of operations.
- Techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures, energisation procedures.

T9 Low voltage overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to low voltage overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment, role and responsibilities of the LV switching operator.
- Operational forms, access authorities and hazard/risk assessments associated with

REQUIRED SKILLS AND KNOWLEDGE

HV switching - types of operational forms, access authorities and hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.

- Use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- LV switchgear – types, categories, application, operating capabilities
- Operation of LV overhead switching or indicating devices - fuses; disconnect fuses; load switching; underslung links, air break switches; disconnects; live line clamps; phasing sticks; phasing tester.
- Operation of protection systems and substation equipment - fault levels and settings; types and applications, protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to LV switching equipment
- Procedures for the isolation of LV distributions main and working earths
- Earthing LV electrical apparatus practices and procedures for access authority issuing
- Low voltage switching techniques
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T10 Preparation of a LV switching instruction encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching sheet schedules
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, isolation points and earthing, responsibilities of the switching operator.
- Techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures.

T11 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

REQUIRED SKILLS AND KNOWLEDGE

T12 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T13 Enterprise specific switching diagrams and drawing encompassing:

- Types and application of enterprise specific switching drawings and documents - wiring and schematic diagrams and switching symbols, mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, instruction/work sheets.
- Interpretation of different system switching diagrams - LV system switching diagrams, DC traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, processes of updating switching diagrams

T14 LV system load calculation principles encompassing:

- Structure of LV systems
- Ratings of LV system components
- Methods of determining load on LV systems
- Records of load on LV systems
- Effect of added load on LV mains - variation of current, voltage, and power factor
- Load flow in parallel operation
- Enterprise specific network coordination tools

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Demonstrate at least three (3) switching programs that between them encompass at least 7 of the following:	<p>A transformer with a LV winding and fixed tap</p> <p>LV busbars</p> <p>LV isolators</p> <p>LHV switchgear (applicable to enterprise equipment)</p> <p>Phasing and phase rotation</p> <p>Commissioning an item of LV plant</p> <p>A planned interruption to an LV customer/s</p> <p>Installation of a mobile generators</p>
B	Prepare switching instructions to isolate, test and earth all of the following	<p>All enterprise transformer types with LV windings</p> <p>All enterprise LV busbar types</p> <p>All enterprise LV feeder types</p> <p>All enterprise LV circuit breakers, isolators or switches</p>
C	Prepare, write and check switching sheets to do all of the following:	<p>Manage load</p> <p>Manage voltage</p> <p>Minimise losses</p> <p>Maximise network reliability</p>
D	Do all of the following:	<p>Check all above types of switching instructions</p> <p>Coordinate all above types of switching instructions</p>

		<p>Calculation of plant loading</p> <p>Application and administration of SCADA or enterprise specific system.</p> <p>Analysis and diagnosis of system failure</p>
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual preparation of LV Distribution Switching programs.

Note:

Access will be needed to: relevant protection, control, metering, and alarm equipment, network drawings, computerised electrical plant control and monitoring facilities, operational event data, enterprise operational policies, procedures and work practices and enterprise crisis management procedures

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment**9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units**9.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with units:

UETTDRSO3 7A Develop high voltage distribution and subtransmission switching programs

UETTDRSO3 8A Develop and evaluate power systems transmission switching programs

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the preparation and/or checking of activities required to place the LV distribution network in a state in which work can safely be performed whilst minimising customer outages and shall be demonstrated using the following:

LV Distribution feeders/distribution network; Transformers with LV windings; LV busbars; LV isolators; LV switchgear (applicable to enterprise equipment); switching instructions (applicable to enterprise equipment); computers (applicable to enterprise equipment); network diagrams (applicable to enterprise equipment); access authorities; regulatory requirements.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification

RANGE STATEMENT

- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 System Operation Units

UETTDRSO37A Develop high voltage distribution and subtransmission switching programs

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the preparation and/or checking of activities required to place the HV distribution and sub transmission network in a state in which work can safely be performed whilst minimising customer outages. The format is typically a written sequence of switching items in a pre-defined format. It includes planning outages and taking into account loading of network components. It also includes planning the management of multiple outages on the HV distribution and sub transmission network and the calculation of network loading conditions to ensure the network is operating within designed parameters.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place

License to practice

3)

subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy

Prerequisite Unit(s)	4)	sector detailed report
	UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRLS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRLS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|---|---|
| 1 Plan for the preparation of HV Distribution and Sub transmission Switching programs | 1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of HV Distribution and Sub transmission Switching system programs, are reviewed and determined. |
| | 1.2 Purpose for the preparation of HV Distribution and sub transmission switching programs is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel. |
| | 1.3 Organisational established procedures on policies and specifications for the preparation of HV Distribution and sub transmission switching programs are obtained or established with the appropriate personnel. |
| | 1.4 Testing/switching procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief. |

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|--|---|
| | 1.5 | Testing/switching parameters are established from organisational established procedures on policies and specifications. |
| | 1.6 | Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures. |
| | 1.7 | Work roles and tasks are allocated according to requirements and individuals' competencies. |
| | 1.8 | Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures. |
| | 1.9 | Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work. |
| | 1.10 | Risk control measures are identified, prioritised and evaluated against the work schedule. |
| | 1.11 | Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures. |
| 2 | Carry out the preparation of HV Distribution and sub transmission switching programs | |
| | 2.1 | Circuit/systems modelling is used to evaluate alternative proposals as per established procedures. |
| | 2.2 | OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures. |
| | 2.3 | Preparation of HV Distribution and sub transmission switching program decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures. |
| | 2.4 | Mathematical and/or engineering models of the program is used to analyse the effectiveness of the finished project as per requirements and |

ELEMENT

PERFORMANCE CRITERIA

- established procedures.
- 2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing of the program is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
- 3 Complete the preparation of HV Distribution and sub transmission switching programs
- 3.1 Final review of the switching program is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or

ELEMENT

PERFORMANCE CRITERIA

regulatory approval.

- 3.4 Approved copies of prepared HV Distribution and sub transmission switching program documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing HV distribution and sub transmission switching programs.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO37A High voltage distribution and subtransmission switching programs

Evidence shall show an understanding of high voltage distribution and subtransmission switching programs to an extent indicated by the following aspects:

T1 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations.

T2 Different types and function of distribution components encompassing:

- Commonwealth/State/Territory and local government legislation, Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of distribution components
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
- Types, function and characteristics of distribution components
- Safety policies and procedures precautions related to the handling and installing distribution components

T3 Co-ordinating access authority procedures encompassing:

- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and co-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe

REQUIRED SKILLS AND KNOWLEDGE

outcome and according to statutory requirements and regulations

- Techniques in the effective utilisation of available resources
- Techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
- Techniques in facilitating and co-ordinating the delivery and issuing of access authorities
- Techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific work site, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, regulatory requirements such as Occupational Health and Safety and electrical safety
- Techniques in the receiving and co-ordinating the cancellation of access authorities in readiness for restoration
- Methods of conducting audits on correct access authority procedures
- Process of issuing of other access authorities for work permits - working in confined space, if required, co-ordination of access authorities, engaging and briefing contractors on electrical and other work
- Issue and receipt of operating agreements.

T4 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T5 High voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, network interconnectors source of possible backfeed
- Role of the HV switching operator
- Operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- Types and categories of HV switchgear
- Application, function and operating capabilities of switchgear
- Restrictions pertaining to HV switching equipment

REQUIRED SKILLS AND KNOWLEDGE

- Procedures for the isolation of HV transmission main and working earths
- Earthing HV electrical apparatus practices and procedures for access - purposes of “Operational” and additional work part “on-site” earths, factors determining the location and effectiveness of “Operational” earthing, acceptable industry procedures, personal protective equipment, high voltage switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T6 High voltage fault switching principles encompassing:

- Primary causes, effects and types of HV electrical faults
- HV protection devices - main components, types, categories, applications, functions
- Basic principle of operation of HV system protection devices
- Protection co-ordination and protection “zoning”
- HV feeder auto-reclosing suppression encompassing – function, application
- Circuit condition requirements and switching considerations when paralleling and separating HV feeders.

T7 High voltage SWER system encompassing:

- Application and function of SWER system components
- Circuit arrangement
- Principle of operation
- Hazards and procedures associated with faulty SWER earth systems
- Procedure to isolate, energise and commission SWER substations

T8 HV system switching principles including switching authorisation procedures to an extent indicated by the following aspects:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of HV systems and equipment to be switched
- Procedures for obtaining correct HV switching authorisation - identification of OHS hazards, assessing and controlling risks, Safety procedures and precautions, safe approach distances
- responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, Requirements for team switching, procedures for coordination of operations.
- Techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures, energisation procedures

T9 HV overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or

REQUIRED SKILLS AND KNOWLEDGE

enterprise requirements applicable to HV overhead and substation switching

- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment.
- Role and responsibilities of the HV switching operator
- Operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc strangles.
- HV switchgear – types, categories, application, operating capabilities.
- Operation of HV overhead switching or indicating devices - fuses; disconnect fuses; load switching; live line indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing sticks; phasing tester
- Operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing; HV switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T10 Preparation of a HV switching instruction schedule encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching instruction schedules
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, points of isolation and earthing locations (safety and working earths), responsibilities of the switching operator.
- Techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures.

T11 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable,

REQUIRED SKILLS AND KNOWLEDGE

uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures

- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T12 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T13 Substation switching practices encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to substation switching
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be switched
- Procedures for obtaining correct HV switching authorization - identification of hazards and controlling risks, safety procedures and precautions, responsibilities and protocols, identifying switching resources,
- Techniques in HV substation switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures, commissioning procedures
- Use, care and operation of equipment associated with HV substation equipment - test instruments, sticks,
- HV switchgear – types, categories, application, operating capabilities
- Basic Operation of protection systems
- Restrictions pertaining to HV substation switching equipment
- Restrictions pertaining to Enterprise Specific procedures.

REQUIRED SKILLS AND KNOWLEDGE

T14 Transient overvoltages encompassing:

- Causes and effects of transient overvoltages - switching transients and lightning transients, effects on plant items
- Control techniques and systems - diverters, shield wires and CB arc control
- Insulation systems - insulation coordination and insulation grading.

T15 Procedure to undertake a visual inspection of a scheme encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with visual inspection procedures of a scheme
- Requirements for the use of manuals, system diagrams/plans and drawings
- Identify obvious deficiencies in operating to the standard functionality
- Techniques in determining device malfunction
- Techniques in determining wiring defects

T16 Commissioning procedures associated with relevant equipment encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures – planning, policy, testing techniques, close out requirements.

T17 Effects of harmonics encompassing:

- Characteristics and effects of harmonics on protection device functions/malfunction
- Effects of harmonics on – transformers, generators, motors, quality of supply.

T18 Different types and function of distribution underground components encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the use and application of distribution underground components
- Requirements for the use of underground line construction manuals, system diagrams/plans and drawings
- Types, function and characteristics of distribution underground components
- Safety policies, procedures and precautions related to the handling and installing distribution underground components

T19 HV system load calculation principles encompassing:

- Structure of HV systems
- Ratings of HV system components
- Relationship to HV customers

REQUIRED SKILLS AND KNOWLEDGE

- Methods of determining load on HV systems
- Records of load on HV systems
- Effect of added load on HV feeders - variation of current, voltage, power, reactive power and power factor
- Load flows in parallel or loop operation
- Enterprise specific network coordination tools

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries

risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination

legislation, regulations, policies and workplace procedures;
and

- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Demonstrate at least three (3) switching programs that between them encompass the following:	A transformer with a HV winding and fixed tap A transformer with a HV winding and on-load tap changer HV busbars HV isolators HV switchgear (applicable to enterprise equipment) Phasing and phase rotation Commissioning an item of HV plant A planned interruption to a HV customer/s Installation of a mobile generators (if applicable to enterprise equipment) Placing distribution feeders in parallel where special considerations are required to cope with capacitors, phase shifts between different bulk supply systems, sensitive earth fault protection, single phase

		switching.
B	Prepare switching instructions to isolate, test and earth all of the following	All enterprise transformer types All enterprise busbar types All enterprise feeder types All enterprise circuit breakers, isolators or switches
C	Prepare, write and check switching sheets to do all of the following:	Manage load Manage voltage Minimise losses Maximise network reliability
D	Do all of the following:	Check all above types of switching instructions Coordinate all above types of switching instructions Calculation of plant loading
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice

using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual the preparation of HV Distribution and Sub transmission Switching programs.

Note:

Access will be needed to: relevant protection, control, metering, and alarm equipment, network drawings, computerised electrical plant control and monitoring facilities, operational event data, enterprise operational policies, procedures and work practices and enterprise crisis management procedures.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with units:

UETTDRSO3 6A Develop low voltage distribution switching programs

UETTDRSO3 Develop and evaluate power systems transmission
8A switching programs

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the preparation and/or checking of activities required to place the HV distribution and sub transmission network (may also be applied to include rail/tram networks) in a state in which work can safely be performed whilst minimising customer outages and shall be demonstrated using the following:

HV distribution feeders/distribution network –radial or loop; HV sub transmission feeders/network –radial or loop; transformers with HV windings and fixed tap; transformers with HV windings and on-load tap changers; HV busbars – indoor and/or outdoor as applicable to enterprise; HV isolators; HV switchgear (applicable to enterprise equipment); switching instructions (applicable to enterprise equipment); computers (applicable to enterprise equipment); network diagrams (applicable to enterprise equipment); access authorities; regulatory requirements

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect

RANGE STATEMENT

- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 System Operation Units

UETTDRSO38A Develop and evaluate power systems transmission switching programs

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the development and evaluation of activities required to place the transmission network in a state in which work can safely be performed whilst minimising customer outages. The format is typically a written sequence of switching items in a pre-defined format. It includes planning for the management of the network and multiple outages. It encompasses the calculation of network loading conditions to ensure the network will operate within design parameters and in compliance with national electricity code.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work.

License to practice

3)

Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

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Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
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UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report

Prerequisite Unit(s) 4)

UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic engineering computational problems
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
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UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus
UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan and coordinate for the preparation of HV Transmission switching programs	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of the switching program, are reviewed and determined.
		1.2	Purpose of the switching program is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Established policies, procedures and specifications for the switching program are obtained or established with the appropriate personnel.
		1.4	Switching procedures are discussed with and/or directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Switching parameters are ascertained from established policies, procedures and specifications.

ELEMENT

PERFORMANCE CRITERIA

- 1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
- 1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
- 1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work.
- 1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
- 1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 2 Carry out and coordinate the preparation of HV Transmission switching programs
 - 2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
 - 2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
 - 2.3 Decisions concerning the preparation of the HV Transmission Switching program are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
 - 2.4 The effectiveness of the finished project is analysed as per requirements and established procedures.
 - 2.5 Technical advice is given regarding potential hazards, safety risks and control measures so

ELEMENT

PERFORMANCE CRITERIA

- that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing of the program is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 3 Complete and coordinate the preparation of HV Transmission switching programs
- 3.1 Final review of the switching program is undertaken to ensure it complies with all requirements and include all specifications and documentations needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of switching program documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing and evaluating transmission switching programs.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO38A Power systems transmission switching programs

Evidence shall show an understanding of power systems transmission switching programs to an extent indicated by the following aspects: Develop and evaluate

T1 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations.

T2 Substations and power transformers encompassing:

- Relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
- Characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling
- Auxiliary equipment used on transformers - function and basic operation
- Maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault finding procedures
- Characteristics of a reactors - description and purpose

T3 Co-ordinating access authority procedures encompassing:

- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and co-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
- Techniques in facilitating and co-ordinating the delivery and issuing of access authorities
- Techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific work site, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, regulatory requirements such as Occupational Health and Safety and electrical safety
- Techniques in the receiving and co-ordinating the cancellation of access authorities in readiness for restoration
- Methods of conducting audits on correct access authority procedures
- Process of issuing of other access authorities for work permits - working in confined space, if required, co-ordination of access authorities, engaging and briefing contractors on electrical and other work
- Issue and receipt of operating agreements.

T4 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T5 High voltage switching principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching of high voltage to a given schedule
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of electrical apparatus, use, characteristics and capabilities of specialised tools and testing equipment, network interconnectors source of possible backfeed
- Role of the HV switching operator
- Operational forms, access authorities and permits associated with HV switching - types of operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc strangles.
- Types and categories of HV switchgear
- Application, function and operating capabilities of switchgear

REQUIRED SKILLS AND KNOWLEDGE

- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV transmission main and working earths
- Earthing HV electrical apparatus practices and procedures for access - purposes of “Operational” and additional work part “on-site” earths, factors determining the location and effectiveness of “Operational” earthing, acceptable industry procedures, personal protective equipment, high voltage switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T6 HV system switching principles including switching authorisation procedures to an extent indicated by the following aspects:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of HV systems and equipment to be switched
- Procedures for obtaining correct HV switching authorisation - identification of OHS hazards, assessing and controlling risks, Safety procedures and precautions, safe approach distances
- responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, Requirements for team switching, procedures for coordination of operations.
- Techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures, energisation procedures

T7 HV overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to HV overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment.
- Role and responsibilities of the HV switching operator
- Operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- HV switchgear – types, categories, application, operating capabilities.
- Operation of HV overhead switching or indicating devices - fuses; disconnect fuses; load switching; live line indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing

REQUIRED SKILLS AND KNOWLEDGE

sticks; phasing tester

- Operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing; HV switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T8 Preparation of a HV switching instruction schedule encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching instruction schedules
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, points of isolation and earthing locations (safety and working earths), responsibilities of the switching operator.
- Techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures.

T9 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T10 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation

REQUIRED SKILLS AND KNOWLEDGE

and First Aid procedures

- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T11 Substation switching practices encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to substation switching
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be switched
- Procedures for obtaining correct HV switching authorization - identification of hazards and controlling risks, safety procedures and precautions, responsibilities and protocols, identifying switching resources,
- Techniques in HV substation switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures, commissioning procedures
- Use, care and operation of equipment associated with HV substation equipment - test instruments, sticks,
- HV switchgear – types, categories, application, operating capabilities
- Basic Operation of protection systems
- Restrictions pertaining to HV substation switching equipment
- Restrictions pertaining to Enterprise Specific procedures

T12 Transient overvoltages encompassing:

- Causes and effects of transient overvoltages - switching transients and lightning transients, effects on plant items
- Control techniques and systems - diverters, shield wires and CB arc control
- Insulation systems - insulation coordination and insulation grading.

T13 Commissioning procedures associated with relevant equipment encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures – planning, policy, testing techniques, close out requirements.

T14 EHV generator control systems encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or

REQUIRED SKILLS AND KNOWLEDGE

enterprise requirements pertaining to the operation of a portable generator

- Safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, synchronising procedures
- Techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load, assessing the appropriateness of the generator
- Operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations, kiosk substations
- EHV generator set and control system to EHV Distribution assets.

T15 Different types and function of transmission components encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the use and application of transmission components
- Requirements for the use of transmission line construction manuals, system diagrams/plans and drawings
- Types, function and characteristics of transmission components
- Safety policies and procedures precautions related to the handling and installing transmission components

T16 EHV system load calculation principles encompassing:

- Structure of EHV transmission systems
- Ratings of EHV system components
- Relationship to EHV customers
- Relationship to generation sources
- Methods of determining load on EHV systems
- Records of load on EHV systems
- Effect of added load on EHV transmission systems - variation of current, voltage, power, reactive power and power factor
- Load flows in parallel or loop operation
- Enterprise specific network coordination tools

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Develop and evaluate, at least four (4) switching programs that between them integrates all of the following:	<p>A transformer with an EHV winding</p> <p>EHV Busbars;</p> <p>EHV Isolators</p> <p>EHV Switchgear (applicable to enterprise equipment)</p> <p>Phasing and phase rotation</p> <p>Commissioning a project that includes more than one item of EHV plant that includes a transformer</p> <p>A planned liaison with a HV customer/s</p> <p>Activities that address the correction of errors in the process</p>
B	Prepare switching instructions, test and earth the following:	<p>Transformer types</p> <p>Busbar types</p> <p>Transmission line types</p> <p>Circuit breakers, isolators or switches</p>
C	All of the following:	<p>Check switching instructions;</p> <p>Calculate plant loading;</p> <p>Manage the development of multiple switching programs</p>
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated

		in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual preparation of HV Transmission Switching programs

Note:

Access will be needed to: relevant modelling tools, drawings, computerised electrical plant control and monitoring facilities and enterprise operational policies, procedures and work practices.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with units:

UETTDRSO3 6A Develop low voltage distribution switching programs

UETTDRSO3 7A Develop high voltage distribution and subtransmission switching programs

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the development and evaluation of activities required to place the transmission network in a state in which work can safely be performed whilst minimising customer outages and may include the following:

EHV transmission network; EHV transmission lines; Transformers with EHV windings ; EHV busbars – indoor and/or outdoor as applicable to enterprise; EHV isolators ; EHV switchgear (applicable to enterprise equipment); switching instructions (applicable to enterprise equipment); computers (applicable to enterprise equipment); network diagrams (applicable to enterprise equipment); access authorities; regulatory requirements.

Conditions and facilities for the calculation of network loading, planning for the management of the network and multiple outages.

Regulatory and enterprise procedures for the compliance with national electricity code.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards

RANGE STATEMENT

- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
System Operation Units

UETTDRSO39A Coordinate low voltage distribution networks

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the monitoring of LV distribution networks in real time. This includes voltage control and monitoring the status of access authorities and ensuring that the network is operated within design parameters at all times. It also includes dispatching and management of field repair crews to respond to and rectify abnormalities.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

- License to practice** **3)**
 Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

- Prerequisite Unit(s)** **4)**

- Competencies** **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic

Prerequisite Unit(s)	4)	
		engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRSO36A	Develop low voltage distribution switching programs

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the management of an LV distribution network	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the management of LV distribution network systems, are reviewed and determined.
		1.2	Purpose for the management of an LV distribution network is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the management of an LV distribution network are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Testing parameters are established from organisational established procedures on policies and specifications.

ELEMENT	PERFORMANCE CRITERIA
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the management of an LV distribution network	2.1 Circuit/systems modelling are used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3 Management decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4 Mathematical and/or engineering models of the LV distribution network are used to analyse the effectiveness of the finished project as per requirements and established procedures.
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities

ELEMENT	PERFORMANCE CRITERIA
	consulted, where necessary, in accordance with requirements and established procedures.
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7 Testing of the LV distribution network is undertaken according to requirements and established procedures.
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
	2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
3 Complete the management of an LV distribution network	3.1 Final review of the management procedures of the LV distribution network are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
	3.4 Approved copies of the managed LV distribution network documents are issued and records are

ELEMENT

PERFORMANCE CRITERIA

updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of coordinating LV distribution networks.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO39A Low voltage distribution networks - coordination

Evidence shall show an understanding of Low voltage distribution networks - coordination to an extent indicated by the following aspects:

T1 Co-ordinating access authority procedures encompassing:

- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and co-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
- Techniques in facilitating and co-ordinating the delivery and issuing of access authorities
- Techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific work site, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, regulatory requirements such as Occupational Health and Safety and electrical safety
- Techniques in the receiving and co-ordinating the cancellation of access authorities in readiness for restoration
- Methods of conducting audits on correct access authority procedures
- Process of issuing of other access authorities for work permits - working in confined space, if required, co-ordination of access authorities, engaging and briefing contractors on electrical and other work
- Issue and receipt of operating agreements.

T2 LV system switching principles including switching authorisation procedures encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings

REQUIRED SKILLS AND KNOWLEDGE

- Types and characteristics of LV systems and equipment to be switched
- Procedures for obtaining correct LV switching authorization - identification of OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching, procedures for coordination of operations.
- Techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures, energisation procedures.

T3 Coordinating and directing switching instructions encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching sheet instructions
- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the co-ordination and directing of switching schedules instructions
- Relationship between the operating authorities and HV customers, operating agreements
- Techniques in co-ordinating and directing HV and LV switching of electrical networks
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
- Responsibilities of the switching operator
- Techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures
- Techniques in gathering, collating and confirming data on switching procedures

T4 Low voltage overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to low voltage overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment, role and responsibilities of the LV switching operator.
- Operational forms, access authorities and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments, purpose and procedure for operational forms, access authorities and

REQUIRED SKILLS AND KNOWLEDGE

hazard/risk assessments.

- Use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- LV switchgear – types, categories, application, operating capabilities
- Operation of LV overhead switching or indicating devices - fuses; disconnect fuses; load switching; underslung links, air break switches; disconnects; live line clamps; phasing sticks; phasing tester.
- Operation of protection systems and substation equipment - fault levels and settings; types and applications, protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to LV switching equipment
- Procedures for the isolation of LV distributions main and working earths
- Earthing LV electrical apparatus practices and procedures for access authority issuing
- Low voltage switching techniques
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T5 Preparation of a LV switching instruction encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching sheet schedules
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, isolation points and earthing, responsibilities of the switching operator.
- Techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Demonstrate on at least three (3) occasions the coordinate system manipulations that encompass the following:	<p>LV distribution network</p> <p>LV network manipulation to control loading on equipment</p> <p>Transformers with LV windings (if applicable to enterprise equipment)</p> <p>LV busbars</p> <p>LV isolators</p> <p>LV switchgear (applicable to enterprise equipment)</p>
B	All of the following:	<p>Write switching instructions</p> <p>Check switching instructions</p> <p>Coordinate switching instructions</p> <p>Calculate plant loading</p> <p>Prepare and authorise LV distribution switching programs</p> <p>Monitor switching progress</p> <p>Monitor the status of access permits/authorities on LV network equipment</p> <p>Ensure network plant operates within design and regulatory requirements on a real time basis</p> <p>Dispatch and communicate with field crews to respond/rectify system</p>

		<p>abnormalities</p> <p>Application and administration of SCADA (if applicable to enterprise equipment)</p> <p>Analyse and diagnose system failures</p> <p>Calculate and analyse paralleling conditions on the interconnected LV system</p>
C	Monitor and manage switching to:	<p>Manage load</p> <p>Manage voltage</p> <p>Minimise loss</p> <p>Maximise system reliability</p> <p>Allow safe network access for maintenance activities</p> <p>Allow safe network access for construction activities</p> <p>Validating fault reports arising from system disturbances</p>
D	At least one occasion	<p>Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.</p>

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual management of an LV distribution network.

Note:

Access will be needed to: relevant protection, control, metering and alarm equipment, network drawings, computerised electrical plant control and monitoring facilities, operational event data, enterprise operational policies, procedures and work practices and crisis management procedures.

In addition to the resources listed above in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with units:

UETTDRSO40A Coordinate high voltage distribution and subtransmission networks

UETTDRSO41A Manage power systems transmission networks

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the monitoring of LV distribution networks in real time ensuring that the network is operated within design parameters at all times and shall be demonstrated using the following:

LV Distribution feeders/distribution network; Transformers with LV windings; LV busbars; LV isolators ; LV switchgear (applicable to enterprise equipment); Switching instructions (applicable to enterprise equipment); computers (applicable to enterprise equipment); network diagrams (applicable to enterprise equipment); access authorities; regulatory requirements.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 System Operation Units

UETTDRSO40A Coordinate high voltage distribution and subtransmission networks

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the monitoring of HV distribution and sub transmission networks in real time. This includes voltage control and monitoring the status of access authorities and ensuring that the network is operated within design parameters at all times. It also includes dispatching and coordination of field repair crews to respond to and rectify abnormalities and liaison with other electrical authorities.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems

Prerequisite Unit(s)	4)	
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the coordination of HV distribution and sub Transmission network	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the coordination of HV distribution and sub transmission Network, are reviewed and determined.
		1.2	Purpose of the coordination of the network is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the coordination of the network are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Testing parameters are established from organisational established procedures on policies

ELEMENT	PERFORMANCE CRITERIA
	and specifications.
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the coordination of HV distribution and sub Transmission network	<p>2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.</p> <p>2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.</p> <p>2.3 Coordination decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.</p> <p>2.4 Mathematical and/or engineering models of the coordination process are used to analyse the effectiveness of the finished project as per requirements and established procedures.</p> <p>2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be</p>

ELEMENT	PERFORMANCE CRITERIA
	undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7 Testing of coordination process is undertaken according to requirements and established procedures.
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
	2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
3 Complete the coordination of HV distribution and sub Transmission network	<p>3.1 Final review of the coordination processes is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of coordination documents are issued and records are updated in accordance</p>

ELEMENT

PERFORMANCE CRITERIA

with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of coordinating HV distribution and sub transmission networks.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO40A High voltage distribution and subtransmission networks - coordination

Evidence shall show an understanding of high voltage distribution and subtransmission networks - coordination to an extent indicated by the following aspects:

T1 Co-ordinating access authority procedures encompassing:

- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and co-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
- Techniques in facilitating and co-ordinating the delivery and issuing of access authorities
- Techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific work site, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, regulatory requirements such as Occupational Health and Safety and electrical safety
- Techniques in the receiving and co-ordinating the cancellation of access authorities in readiness for restoration
- Methods of conducting audits on correct access authority procedures
- Process of issuing of other access authorities for work permits - working in confined space, if required, co-ordination of access authorities, engaging and briefing contractors on electrical and other work
- Issue and receipt of operating agreements.

T2 HV system switching principles including switching authorisation procedures to an extent indicated by the following aspects:

- Legislation, Standards, codes, legislation, supply authority regulations and or

REQUIRED SKILLS AND KNOWLEDGE

enterprise requirements applicable to system switching

- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of HV systems and equipment to be switched
- Procedures for obtaining correct HV switching authorisation - identification of OHS hazards, assessing and controlling risks, Safety procedures and precautions, safe approach distances
- responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, Requirements for team switching, procedures for coordination of operations.
- Techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures, energisation procedures

T3 Coordinating and directing switching instructions encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching sheet instructions
- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the co-ordination and directing of switching schedules instructions
- Relationship between the operating authorities and HV customers, operating agreements
- Techniques in co-ordinating and directing HV and LV switching of electrical networks
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
- Responsibilities of the switching operator
- Techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures
- Techniques in gathering, collating and confirming data on switching procedures

T4 HV overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to HV overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment.
- Role and responsibilities of the HV switching operator

REQUIRED SKILLS AND KNOWLEDGE

- Operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- HV switchgear – types, categories, application, operating capabilities.
- Operation of HV overhead switching or indicating devices - fuses; disconnect fuses; load switching; live line indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing sticks; phasing tester
- Operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing; HV switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T5 Preparation of a HV switching instruction schedule encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching instruction schedules
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, points of isolation and earthing locations (safety and working earths), responsibilities of the switching operator.
- Techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Demonstrate on at least three (3) occasions the coordination of system manipulations that encompass:	<p>HV sub transmission and distribution network</p> <p>HV sub transmission and distribution network manipulation to control loading on equipment</p> <p>Transformers with HV windings (if applicable to enterprise equipment</p> <p>HV busbars</p> <p>HV isolators</p> <p>HV switchgear (applicable to enterprise equipment).</p>

B	All of the following:	<p>Write switching instructions</p> <p>Check switching instructions</p> <p>Coordinate switching instructions</p> <p>Calculate plant loading</p> <p>Prepare and authorise HV sub transmission and distribution switching program</p> <p>Monitor switching progress</p> <p>Monitor the status of access permits/authorities on HV network equipment</p> <p>Ensure network plant operates within design and regulatory requirements on a real time basis</p> <p>Dispatch and communicate with field crews to respond/rectify system abnormalities</p> <p>Application and administration of SCADA (if applicable to enterprise equipment)</p> <p>Analyse and diagnose system failures</p> <p>Calculate and analyse paralleling conditions on the interconnected HV system</p>
C	Monitor and manage switching to:	<p>Manage load</p> <p>Manage voltage</p> <p>Minimise loss</p>

		<p>Maximise system reliability</p> <p>Allow safe network access for maintenance activities</p> <p>Allow safe network access for construction activities</p> <p>Validating fault reports arising from system disturbances</p>
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual coordination of HV distribution and sub transmission Network.

Note:

Access will be needed to: relevant protection, control, metering and alarm equipment, network drawings, computerised electrical plant control and monitoring facilities, operational event data, enterprise operational policies, procedures and work practices and crisis management procedures.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of

conditions.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with units:

UETTDRSO39A Coordinate low voltage distribution
networks

UETTDRSO41A Manage power systems transmission
networks

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the monitoring of HV distribution and sub transmission networks (may also be applied to include rail/tram networks), ensuring that the network is operated within design parameters at all times and shall be demonstrated using the following:

HV Sub transmission feeders/sub transmission network; HV Distribution feeders/distribution network; transformers with HV windings; HV busbars; HV isolators; HV switchgear (applicable to enterprise equipment); Switching instructions (applicable to enterprise equipment); computers (applicable to enterprise equipment); network diagrams (applicable to enterprise equipment); access authorities; regulatory requirements.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS

RANGE STATEMENT

- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 System Operation Units

UETTDRSO41A Manage power systems transmission networks

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the monitoring of EHV transmission networks in real time. This includes voltage control and monitoring the status of access authorities and ensuring that the network is operated within design parameters at all times. It also includes dispatching and management of field repair crews to respond to and rectify abnormalities and liaison with other electrical authorities.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice**3)**

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems

Prerequisite Unit(s)	4)	
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRSO48A	Respond to discrete and interdependent protection operations
	UETTDRSO49A	Coordinate power system operations in a regulated energy market
	Distribution and Subtransmission Pathway Unit Group	
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs
	UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks
	Transmission Pathway Unit Group	
	UETTDRSO38A	Develop and evaluate power systems transmission switching programs

Prerequisite Unit(s) 4)

UETTDRSO47A Coordinate high voltage transmission network

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the management of Transmission networks	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the management of transmission network systems, are reviewed and determined.</p> <p>1.2 Purpose of the management of the transmission networks is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Organisational established procedures on policies and specifications for the management of transmission networks are obtained or established with the appropriate personnel.</p> <p>1.4 Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.</p> <p>1.5 Testing parameters are established from organisational established procedures on policies and specifications.</p> <p>1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.</p> <p>1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.</p> <p>1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.</p> <p>1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.</p> <p>1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.</p> <p>1.11 Relevant work permits are secured to coordinate the performance of work according to</p>

ELEMENT	PERFORMANCE CRITERIA
	requirements and/or established procedures.
2 Carry out the management of Transmission networks	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3 Management decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4 Mathematical and/or engineering models of the Transmission Network are used to analyse the effectiveness of the finished project as per requirements and established procedures.
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7 Testing of management processes is undertaken according to requirements and established procedures.
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.

ELEMENT	PERFORMANCE CRITERIA
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
	2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
3 Complete the management of Transmission networks	3.1 Final review of management processes are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
	3.4 Approved copies of management procedure documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of managing transmission networks.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO41A Power systems transmission networks - management

Evidence shall show an understanding of power systems transmission networks - management to an extent indicated by the following aspects:

T1 Co-ordinating access authority procedures encompassing:

- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and co-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
- Techniques in facilitating and co-ordinating the delivery and issuing of access authorities
- Techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific work site, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, regulatory requirements such as Occupational Health and Safety and electrical safety
- Techniques in the receiving and co-ordinating the cancellation of access authorities in readiness for restoration
- Methods of conducting audits on correct access authority procedures
- Process of issuing of other access authorities for work permits - working in confined space, if required, co-ordination of access authorities, engaging and briefing contractors on electrical and other work
- Issue and receipt of operating agreements.

T2 HV system switching principles including switching authorisation procedures to an extent indicated by the following aspects:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings

REQUIRED SKILLS AND KNOWLEDGE

- Types and characteristics of HV systems and equipment to be switched
- Procedures for obtaining correct HV switching authorisation - identification of OHS hazards, assessing and controlling risks, Safety procedures and precautions, safe approach distances
- responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, Requirements for team switching, procedures for coordination of operations.
- Techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures, energisation procedures

T3 Coordinating and directing switching instructions encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching sheet instructions
- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the co-ordination and directing of switching schedules instructions
- Relationship between the operating authorities and HV customers, operating agreements
- Techniques in co-ordinating and directing HV and LV switching of electrical networks
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
- Responsibilities of the switching operator
- Techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures
- Techniques in gathering, collating and confirming data on switching procedures

T4 HV overhead and substation switching principles encompassing: Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to HV overhead and substation switching

- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment.
- Role and responsibilities of the HV switching operator
- Operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and

REQUIRED SKILLS AND KNOWLEDGE

permits hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.

- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- HV switchgear – types, categories, application, operating capabilities.
- Operation of HV overhead switching or indicating devices - fuses; disconnect fuses; load switching; live line indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing sticks; phasing tester
- Operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing; HV switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T5 Preparation of a HV switching instruction schedule encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching instruction schedules
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, points of isolation and earthing locations (safety and working earths), responsibilities of the switching operator.
- Techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Demonstrate on at least three (3) occasions the management of system manipulations that encompass:	<p>EHV transmission network</p> <p>EHV network manipulation to control loading on equipment</p> <p>Transformers with EHV windings (if applicable to enterprise equipment)</p> <p>EHV busbars</p> <p>EHV isolators</p> <p>EHV switchgear (applicable to enterprise equipment).</p>
B	All of the following:	<p>Write switching instructions</p> <p>Check switching instructions</p> <p>Coordinate switching instructions</p> <p>Calculate plant loading</p> <p>Prepare and authorise EHV switching programs</p> <p>Monitor switching progress</p> <p>Monitor the status of access permits/authorities on EHV network equipment</p> <p>Ensure network plant operates within design and regulatory requirements on a real time basis</p> <p>Dispatch and communicate with field crews to respond/rectify system</p>

		<p>abnormalities</p> <p>Application and administration of SCADA (if applicable to enterprise equipment)</p> <p>Analyse and diagnose system failures</p> <p>Calculate and analyse network conditions on the interconnected EHV system.</p>
C	Monitor and manage switching to:	<p>Manage load</p> <p>Manage voltage</p> <p>Minimise loss</p> <p>Maximise system reliability</p> <p>Allow safe network access for maintenance activities</p> <p>Allow safe network access for construction activities</p> <p>Validating fault reports arising from system disturbances</p>
D	At least one occasion	<p>Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.</p>

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual management of transmission networks

Note:

Access will be needed to: relevant protection, control, metering and alarm equipment, network drawings, computerised electrical plant control and monitoring facilities, operational event data, enterprise operational policies, procedures and work practices and crisis management procedures.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with units:

UETTDRSO3 Coordinate low voltage distribution networks
9A

UETTDRSO4 Coordinate high voltage distribution and
0A subtransmission networks

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the management of a transmission network ensuring that the network is operated within design parameters at all times and shall be demonstrated using the following:

EHV transmission network; transformers with EHV windings; EHV busbars; EHV isolators EHV Switchgear (applicable to enterprise equipment); switching instructions (applicable to enterprise equipment); computers (applicable to enterprise equipment); network diagrams (applicable to enterprise equipment); access authorities; regulatory requirements

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

System Operation Units

UETTDRSO42A Manage power systems transmission network demand

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the management of the switching of transmission network components with due regard to the loadings and prevailing network constraints and may include scheduling of generators, VAR compensators, load shedding and non-essential loads in response to NEMMCO or network requirements. It also includes voltage and frequency controls.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice**3)**

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems

Prerequisite Unit(s)	4)	
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRSO41A	Manage power systems transmission networks
	UETTDRSO48A	Respond to discrete and interdependent protection operations
	UETTDRSO49A	Coordinate power system operations in a regulated energy market
	Distribution and Subtransmission Pathway Unit Group	
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs
	UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks
	Transmission Pathway Unit Group	

Prerequisite Unit(s) 4)

UETTDRSO38A	Develop and evaluate power systems transmission switching programs
UETTDRSO47A	Coordinate high voltage transmission network

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the management of transmission network demand	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the management of transmission network demand systems, are reviewed and determined.</p> <p>1.2 Purpose of the management of transmission network demand is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Organisational established procedures on policies and specifications for the management of transmission network demand are obtained or established with the appropriate personnel.</p> <p>1.4 Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.</p> <p>1.5 Testing parameters are established from organisational established procedures on policies and specifications.</p> <p>1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.</p> <p>1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.</p> <p>1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.</p> <p>1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.</p> <p>1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.</p> <p>1.11 Relevant work permits are secured to coordinate the performance of work according to</p>

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the management of transmission network demand	requirements and/or established procedures.
2.1	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
2.2	OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
2.3	Management decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
2.4	Mathematical and/or engineering models of the transmission network demand are used to analyse the effectiveness of the finished project as per requirements and established procedures.
2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
2.7	Testing of management process is undertaken according to requirements and established procedures.
2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.

ELEMENT	PERFORMANCE CRITERIA
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
	2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
3 Complete the management of transmission network demand	3.1 Final review of management process is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
	3.4 Approved copies of the managed transmission network demand documents are issues and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of managing transmission network demand.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO42A Power systems transmission network demand - management

Evidence shall show an understanding of power systems transmission network demand - management to an extent indicated by the following aspects:

T1 Enterprise specific procedures and work practices relating to managing network demand encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the procedures and work practices relating to managing network demand
- Requirements for the use of demand management manuals, system diagrams/plans and drawings
- Identify and interpret enterprise demand management procedures
- Techniques in the applying enterprise demand management procedures

T2 Effective management and communication encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to assisting in effective management and communication
- Enterprise operational principles - workplace OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures, anti-discrimination policies and procedures.
- Relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to OHS training, methods of addressing barriers such as literacy and cultural differences and provisions relating to OHS issue resolution
- Techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management, range of support services and expertise available.
- Techniques in managing relationships - identifying problems, methods of conflict resolution, methods of consultation, communication, negotiation and mentoring, strategies for positive feedback.
- Techniques in leadership in achieving enterprise strategic and operational plans
- Techniques in managing relationships under stress - stress management.

T3 Methodology used in writing enterprise specific management reports

REQUIRED SKILLS AND KNOWLEDGE

encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the writing enterprise specific management reports
- Techniques in researching, collating and analysing information for the report - recording, filing, retrieving systems, storing and retrieving data from computer systems.
- Relationship of management reports to enterprise policies and procedures - enterprise structure and resources, workplace OHS and risk management enterprise data, financial and operational data, environmental enterprise policies and procedures, industrial relations policies and procedures, anti-discrimination policies and procedures.
- Techniques in writing enterprise specific management reports - methods used to disseminate information and facilitate enterprise requirements, document proformas and compliance and legislative requirements to produce effective reports in the appropriate format.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord

with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as

- specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Demonstrate at least three (3) system manipulations that encompass the following:	EHV transmission network Transmission network manipulation to control loading on equipment Transformers with EHV windings EHV busbars EHV isolators EHV switchgear (applicable to enterprise equipment) Dispatch of Static/Synchronous VAR compensation (if applicable to enterprise) Dispatch of generation (if applicable to enterprise).

B	All of the following:	<p>Writing switching instructions</p> <p>Analysis and review switching instructions</p> <p>Manage multiple switching instructions</p> <p>Calculating line loading</p> <p>Preparing and authorising EHV transmission switching programs</p> <p>Demonstrate application and administration of SCADA or equivalent.</p> <p>Analysis and diagnosis of system failure</p> <p>Calculate and analyse transmission line conditions on the interconnected EHV system.</p>
C	Prepare, write and check switching sheets to:	<p>Manage load</p> <p>Manage voltage</p> <p>Minimise loss</p> <p>Maximise system reliability</p> <p>Allow safe network access for maintenance activities</p> <p>Allow safe network access for construction activities</p> <p>Validating fault reports arising from system disturbances</p> <p>Dispatch static/synchronous VAR compensation (if applicable to</p>

		enterprise) Dispatch generation (if applicable to enterprise)
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual management of transmission network demand.

Note:

Access will be needed to: relevant network modelling tools, drawings, computerised electrical plant control and monitoring facilities, operational event data and enterprise operational policies, procedures and work practices

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the management of the switching of transmission network components with due regard to the loadings and prevailing network constraints and shall be demonstrated using the following equipment:

EHV distribution feeders/distribution network; transformers or regulators with EHV windings; EHV busbars; EHV isolators; EHV switchgear (applicable to enterprise equipment); generators, VAR compensators, load shedding and non-essential loads; switching instructions (applicable to enterprise equipment); computers (applicable to enterprise equipment); network diagrams (applicable to enterprise equipment).

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification

RANGE STATEMENT

- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 System Operation Units

UETTDRSO43A Coordinate low voltage distribution network demand

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the coordination of the switching of LV distribution network components with due regard to the loadings and prevailing network constraints and may include scheduling of generators, VAR compensators, load shedding and non-essential loads in response to NEMMCO or network requirements. It also includes voltage control equipment.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice**3)**

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems

Prerequisite Unit(s)	4)	
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRSO36A	Develop low voltage distribution switching programs
	UETTDRSO39A	Coordinate low voltage distribution networks

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the coordination of LV distribution network demand	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the coordination of LV Distribution network demand systems, are reviewed and determined.
		1.2	Purpose of the coordination of the network demand is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the coordination of the network demand are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Testing parameters are established from organisational established procedures on policies

ELEMENT	PERFORMANCE CRITERIA
	and specifications.
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the coordination of LV distribution network demand	<p>2.1 Circuit/systems modelling are used to evaluate alternative proposals as per established procedures.</p> <p>2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.</p> <p>2.3 Coordination decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.</p> <p>2.4 Mathematical and/or engineering models of the coordination process are used to analyse the effectiveness of the finished project as per requirements and established procedures.</p> <p>2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be</p>

ELEMENT**PERFORMANCE CRITERIA**

		undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7	Testing of the coordination process is undertaken according to requirements and established procedures.
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
	2.11	Strategic plans are developed incorporating organisation initiatives as per established procedures.
3	Complete the coordination of LV distribution network demand	<p>3.1 Final review of the coordination process is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of managed LV Distribution network demand documents are issues and</p>

ELEMENT

PERFORMANCE CRITERIA

records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of coordinating LV distribution network demand.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO43A Low voltage distribution network demand - coordination

Evidence shall show an understanding of low voltage distribution network demand - coordination to an extent indicated by the following aspects:

T1 Enterprise specific procedures and work practices relating to managing network demand encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the procedures and work practices relating to managing network demand
- Requirements for the use of demand management manuals, system diagrams/plans and drawings
- Identify and interpret enterprise demand management procedures
- Techniques in the applying enterprise demand management procedures

T2 Effective management and communication encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to assisting in effective management and communication
- Enterprise operational principles - workplace OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures, anti-discrimination policies and procedures.
- Relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to OHS training, methods of addressing barriers such as literacy and cultural differences and provisions relating to OHS issue resolution
- Techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management, range of support services and expertise available.
- Techniques in managing relationships - identifying problems, methods of conflict resolution, methods of consultation, communication, negotiation and mentoring, strategies for positive feedback.
- Techniques in leadership in achieving enterprise strategic and operational plans
- Techniques in managing relationships under stress - stress management.

T3 Methodology used in writing enterprise specific management reports

REQUIRED SKILLS AND KNOWLEDGE

encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the writing enterprise specific management reports
- Techniques in researching, collating and analysing information for the report - recording, filing, retrieving systems, storing and retrieving data from computer systems.
- Relationship of management reports to enterprise policies and procedures - enterprise structure and resources, workplace OHS and risk management enterprise data, financial and operational data, environmental enterprise policies and procedures, industrial relations policies and procedures, anti-discrimination policies and procedures.
- Techniques in writing enterprise specific management reports - methods used to disseminate information and facilitate enterprise requirements, document proformas and compliance and legislative requirements to produce effective reports in the appropriate format.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord

with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as

- specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Demonstrate at least three (3) coordinate of multiple simultaneous system manipulations that encompass the following:	LV distribution network LV network manipulation to control loading on equipment Transformers with LV windings (if applicable to enterprise equipment) LV busbars LV isolators LV switchgear (applicable to enterprise equipment).
B	All of the following:	Writing switching instructions Checking and review switching instructions Coordinating multiple simultaneous switching

		<p>instructions</p> <p>Confirm line loading</p> <p>Preparing and authorising LV distribution switching programs</p> <p>Coordinate multiple switching processes</p> <p>Coordinate the status of all access permits/authorities on LV network equipment relevant to the scope</p> <p>Ensure network plant operates within design and regulatory requirements on a real time basis</p> <p>Application and administration of SCADA or equivalent.</p> <p>Analysis, diagnosis and reporting of system failure</p> <p>Calculate and analyse paralleling conditions on the interconnected LV system.</p>
C	Prepare, write and check switching sheets to:	<p>Manage load</p> <p>Manage voltage</p> <p>Minimise loss</p> <p>Maximise system reliability</p> <p>Allow safe network access for maintenance activities</p> <p>Allow safe network access for construction activities</p> <p>Validating fault reports arising from system</p>

		disturbances.
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual the coordination of LV distribution network demand.

Note:

Access will be needed to: relevant modelling tools, drawings, computerised electrical plant control and monitoring facilities and enterprise operational policies, procedures and work practices.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and

associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the coordination of a switching of LV distribution network components with due regard to the loadings and prevailing network constraints and shall be demonstrated using the following:

LV distribution feeders/distribution network; transformers or regulators with LV windings; LV busbars; LV isolators ; LV switchgear (applicable to enterprise equipment); generation that interconnects with the LV network; VAR compensation devices that interconnect with the LV network; switching instructions (applicable to enterprise equipment); computers (applicable to enterprise equipment); network diagrams (applicable to enterprise equipment).

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification

RANGE STATEMENT

- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 System Operation Units

UETTDRSO44A Develop crisis power systems management plans

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the preparation of crisis management plans, which can be implemented following the loss of one or more items of plant. This unit involves the activities associated with the assessment of risk, the probability of failure, the consequences of failure and the plant and/or network loads that will result as per established enterprise procedures.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

License to practice**3)**

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic

Prerequisite Unit(s)	4)	engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRSO32A	Manage power systems network faults
	UETTDRSO33A	Manage power systems critical events
	UETTDRSO41A	Manage power systems transmission networks
	UETTDRSO48A	Respond to discrete and interdependent protection operations
	UETTDRSO49A	Coordinate power system operations in a regulated energy market
	UETTDRSO50A	Respond to complex power system protection operations
	Generation/Distribution and Subtransmission Pathway Unit Group	

Prerequisite Unit(s)	4)	
	UETTDRSO34A	Control power systems generating plant
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs
	UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks
Generation/Transmission Pathway Unit Group		
	UETTDRSO34A	Control power systems generating plant
	UETTDRSO38A	Develop and evaluate power systems transmission switching programs
	UETTDRSO47A	Coordinate high voltage transmission network
Distribution and Subtransmission Pathway Unit Group		
	UETTDRSO35A	Manage high voltage distribution and subtransmission network demand
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs
	UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks
Transmission Pathway Unit Group		
	UETTDRSO38A	Develop and evaluate power systems transmission switching programs
	UETTDRSO41A	Manage power systems transmission networks
	UETTDRSO42A	Manage power systems transmission network demand
	UETTDRSO47A	Coordinate high voltage transmission network

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Plan for the development of crisis management plans	1.1	OHS practices/procedures and environmental and sustainable energy procedures which may influence the development of crisis management plans systems are reviewed and determined.
		1.2	Purpose of the development of crisis management plans is established after data is analysed and expected outcomes of the work are

ELEMENT	PERFORMANCE CRITERIA
	confirmed with the appropriate personnel.
1.3	Organisational established procedures on policies and specifications for the development of crisis management plans are obtained or established with the appropriate personnel.
1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
1.5	Testing parameters are established from organisational established procedures on policies and specifications.
1.6	Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
1.7	Work roles and tasks are allocated according to requirements and individuals' competencies.
1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
1.10	Risk control measures are identified, prioritised and evaluated against the work schedule.
1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2	Carry out the development of crisis management plans
2.1	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
2.2	OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with

ELEMENT**PERFORMANCE CRITERIA**

- requirements and/or established procedures.
- 2.3 Development of crisis management plans decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
- 2.4 Mathematical and/or engineering models of the development are used to analyse the effectiveness of the finished project as per requirements and established procedures.
- 2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing of crisis development plans is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the development of crisis management plans	<p>3.1 Final review of the crisis management plans are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of the developed crisis management plan documents are issues and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing crisis management plans.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO44A Crisis power systems management plans

Evidence shall show an understanding of crisis power systems management plans to an extent indicated by the following aspects:

T1 Enterprise specific procedures and work practices relating to critical events encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the procedures and work practices relating to critical events
- Requirements for the use of operational manuals, system diagrams/plans and drawings
- Identify and interpret enterprise operating procedures
- Techniques in the applying enterprise operating procedures.

T2 Methodology in analysing network event records encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the analysis of critical events
- Requirements for the use of critical event data, manuals, system diagrams/plans and drawings
- Sources of critical event data
- Analyse and assess network event records and relevant data - the use of event records and data to analyse and develop optimal network restoration strategies taking into account public and employee safety, enterprise reliability guidelines and resource availability
- Safety policies, procedures and precautions related to critical events - Occupational Health and Safety hazards and precautions, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment, checking integrity of the system for minimum disruption, effective communication methods and chain of command, emergency response and rescue including First Aid procedures.

T3 Preparation of policies and procedures encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the preparation of policies and procedures

REQUIRED SKILLS AND KNOWLEDGE

- Types of standard forms, documentation and data
- Techniques in disseminating policies and procedures
- Techniques in undertaking approval processes.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing

on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of

contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Do all of the following:	<p>Identify a crisis event</p> <p>Develop a plan to manage a crisis</p> <p>Formulate plans in order that the network be restored during and after the crisis</p> <p>Effectively liaise with operating authorities and field crews develop and formulate achievable crisis management plans</p> <p>Document/de-brief actions that are required following an end of crisis situation</p>
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual development of crisis management plans

Note:

Access will be needed to: relevant protection, control, metering, and alarm equipment, network drawings, computerised electrical plant control and monitoring facilities, operational event data, enterprise operational policies, procedures and work practices and crisis management procedures.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the management of critical event operations such as simultaneous multiple network faults and storm events of various magnitudes and shall be demonstrated using the following:

Equipment includes; sectionalisers, security, sensitive earth fault protection, communication bearers, local trip circuits, inter-trip circuits, remote control supervisory circuits, frequency injection units, under frequency circuits, voice frequency protection signalling, micro-controllers, RDC and MUX units, pilot cables, telephone lines, microwave bearers, cossonay earthwire carriers and optical fibre cables.

Equipment also includes; LV fuses, links and bridges, HV links, fuses, reclosers, ring main units, circuit breakers, isolators, earth switches, sectionalisers, air break switches, capacitor banks, transformer taps, metering and protection equipment, data communication systems. Primary and secondary voltage and current injection equipment; time delay measuring equipment; current transformers; voltage transformers; power transformers; tapchangers; circuit breakers; capacitor banks; ring main units; audio frequency load control; circuit breaker auxiliary systems; substation and metal structure earthing systems; SCADA interfaces and transducer inputs; local opto-isolated alarms; PLC programs; auto reclosers (ACRs); protection relays; metering; control circuits; Statistical metering systems; frame leakage relays; distance relays; pilot wire relays; transformer differential relays; busbar differential relays; impedance bus zone relays; overcurrent and earth fault relays; transformer neutral check relays; circuit breaker fail relays; multi-trip relays; auto recloser relays; voltage transformer failure relays; surge protection relays; buchholz relays; winding temperature relays; sensitive earth fault relays; phase failure relays; frequency relays; load shedding relays; general protection LV devices; oil temperature protection devices; oil surge protection devices; power supplies. differential relays; power systems; multi-faceted schemes; interactive overload schemes, distance protection (incorporating relay selection, switched/non-switched schemes; mutual coupling and teed feeder systems); protection signalling (incorporating series, direct, permissive, distance acceleration, block interruption); telecommunication circuits and equipment; alternators; generator differential protection; over/under speed protection; over/under flux protection; synchroscopes; excitation circuits; governors.

Communication equipment may include: Fixed radio; mobile radio; satellite; SACS controllers; computer hardware and software; programmable controllers; modems; digital line drivers (low and high speed); fibre optic line drivers (low and high speed); radio links including voice link and digital bearer; wave trap.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

RANGE STATEMENT

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

System Operation Units

UETTDRSO45A Operate and monitor system SCADA equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the skills and knowledge to operate, monitor and control HV apparatus on the network via SCADA control

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UETTDREL15A	Respond to power systems technical enquiries and requests

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading	5	Writing	5	Numeracy	5
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Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan and prepare for the operation, monitoring and control of system equipment	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of the switching program, are reviewed and determined.</p> <p>1.2 System requirements are established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 System and associated equipment operational prerequisites are identified and established in accordance with manufacturers and/or enterprise/site procedures</p> <p>1.4 System monitoring and control procedures are discussed with and/or directed to the appropriate personnel in order to ascertain the project brief.</p> <p>1.5 Operational parameters are ascertained from established policies, procedures and specifications.</p> <p>1.6 Work roles and tasks are allocated according to requirements and individuals' competencies.</p> <p>1.7 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.</p> <p>1.8 Liaison and communication issues with other/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work.</p>

ELEMENT	PERFORMANCE CRITERIA
	1.9 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.10 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out and coordinate the operation, monitoring and control of system equipment	2.1 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.2 Decisions concerning the operation, monitoring and control of system equipment are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.3 The effectiveness of the finished project is analysed as per requirements and established procedures.
	2.4 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.5 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.6 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
	2.7 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
	2.8 Quality of work is monitored against personal performance agreement and/or established

ELEMENT**PERFORMANCE CRITERIA**

- organisational and professional standards.
- 3 Complete the operation, monitoring and control of system equipment
- 3.1 Final review of the operation, monitoring and control of system equipment is undertaken to ensure it complies with all requirements and include all specifications and documentations needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing and evaluating transmission switching programs.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO45A SCADA system equipment - operation and monitoring

Evidence shall show an understanding of SCADA system equipment - operation and monitoring to an extent indicated by the following aspects:

T1 Supervisory control and data acquisition systems encompassing:

- SCADA system features and applications - industries in which SCADA systems are used, associate benefits of the package, features and facilities of different SCADA packages, hardware requirements.
- Reading mimics and animated graphics
- Trending - analysis of process to select data, viewing data and graphical representation of selected information, trend graphs and data matching.
- Alarm logging - analysing select data, corrective action of alarm status

T2 Personal computer operating systems encompassing:

- Basic function, components and concepts
- Operating systems in use
- System installation and configuration

T3 Computers applications encompassing:

- Application software types
- Configurations and preferences
- Use of particular software packages - word processor, spreadsheet, database, presentation software, web/document publisher, CAD/drawing packages, email client, business management.

T4 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and

REQUIRED SKILLS AND KNOWLEDGE

distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T5 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T6 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T7 Power distribution network documentation encompassing:

- Requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, instruction/worksheets sheets.
- Interpretation of different diagrams and documentation on LV and HV systems - overhead distribution extensions, underground distribution extensions, distribution

REQUIRED SKILLS AND KNOWLEDGE

substation, street lighting system.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to

safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Perform on at least three (3) occasions the following:	Evidence of switching programs involving the operation and monitoring of system equipment via SCADA
B	Perform on at least two (2) occasions the following:	Evidence of unplanned switching events involving the operation and monitoring of system equipment via SCADA
C	Demonstrate the following:	Extract data used in the analysis of network loading trends
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.

- Suitable work environment, facilities, equipment and materials to undertake actual preparation of the monitoring, control and operation of system equipment

Note:

Access will be needed to: relevant modelling tools, drawings, computerised electrical plant control and monitoring facilities and enterprise operational policies, procedures and work practices.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the operation, monitoring and control of system equipment include the following:

Equipment shall include network primary and secondary plant types applicable to the enterprise. This may include machines, circuit breakers, tap changers, protection settings, capacitor/condenser banks, switch gear, generators and transformers.

Safety standards may include relevant sections of Occupational Health and Safety legislation, enterprise safety rules, relevant state and federal legislation, national standards for plant and environmental legislation.

Information and documentation sources may include verbal or written communications; enterprise safety rules documentation; enterprise operating instructions; dedicated computer equipment; enterprise/site standing and operating instructions; enterprise log books; manufacturer's operation and maintenance manuals; and equipment and alarm manuals.

Technical and operational indicators may include stimuli, local indicators and recorders, computers and alarms (visible and or audible).

Communications may be by means of telephone, two way radio, pager, public address system, computer (electronic mail) and operating log (written or verbal).

Appropriate personnel to consult, give or receive direction may include supervisor/team leader or equivalent, power plant operations personnel or equivalent, technical and engineering officers or equivalent, maintenance staff, other operating staff or equivalent, system controller/network controller, field operator and restricted HV operators.

Operations may be continuous operation or during inclement or otherwise harsh weather conditions or during night periods.

Faults and abnormal operating conditions may include control equipment failure/malfunctions/ parameters out of specification, loss of electrical supply to plant and equipment, loss of transmission components, system limitations due to location, weather conditions, natural disasters, accidents, temperature and power swings.

Key indicators may include voltage, current, reactive power flows, load, equipment loading limits and system node points.

Voltage control may include synchronous compensatory, generation VAR output, capacitor/condenser, tap changers and system configuration.

System integrity may include machine and system instability, transmission line and transformer overloading, incorrect tap changer position, protection settings, voltage transformer selection, synchronising, required load shedding and capacitor/condenser bank selection.

RANGE STATEMENT

Operational prerequisites may include switching programmes, pre-operational checks and plant status.

Regulatory and enterprise procedures for the compliance with national electricity code.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
 System Operation Units

UETTDRSO46A Monitor and control the field staff activities

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the monitoring of permit to work requests, dispatching personnel, responding to alarms, travel and activity monitoring of field personnel, monitoring work activities of field personnel against work schedule, contingency skills, response to third party enquiries, out of hour, response to man down alarm, tracking of field personnel (remote area), monitoring activities on system equipment, monitoring availability of assets (maintain a log), monitor equipment status, coordinating field activities, controlling and authorising field works, preparing incident reports.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where

License to practice**3)**

applicable contracts of training such as New Apprenticeships and the like.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

To minimise incidents related to safe systems of work, entry into this unit requires at a minimum that an individual has demonstrated or possesses relevant technical engineering discipline competencies of at least AQF level 3. It is intended that an individual will be expected to perform with a large degree of autonomy in decision-making, whilst in an individual environment.

This may include immediate response to protect human life, adverse effect on safety, security of supply or the integrity of the assets.

NOTE: Typically the following disciplines provide direct entry; electrical or instrumentation, fitting and turning or mechanical trade.

Where an individual does not possess or demonstrate the requisite entry requirement, an equivalent bridging program shall be used to ensure equivalence of entry.

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the monitoring and controlling of field activities	1.1	Work schedules, plans, requirements, established procedures detailed and analysed and if necessary the extent of the preparation of the work determined for planning and coordination
		1.2	Shift hand-over detail is received, understood and confirmed according to established procedures
		1.3	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes to a quality standard and in accordance with established procedures

ELEMENT	PERFORMANCE CRITERIA
1.4	Risk control measures for identified hazards are prioritised, implemented and evaluated against the work schedule
1.5	Salient system constraints are communicated to relevant persons and identified for work sites as per established procedures
1.6	Operational and commercial requirements are communicated to stakeholders as per established procedures
1.7	OHS, environmental and sustainable energy policies and procedures related to the work are identified to ensure safe systems of work are followed
1.8	Relevant work permits are secured to coordinate the performance of work according to requirements and established procedures
1.9	Liaison and communication with authorised persons, authorities, clients and land-owners is performed/actioned and activities are coordinated to carry out work
2 Undertake monitoring and controlling of field activities	<p>2.1 OHS policies and procedures and safe work practices are followed to eliminate or minimise incidents and hazards</p> <p>2.2 Work is performed and coordinated in accordance with a work schedule and established procedures</p> <p>2.3 OHS risks are monitored and action taken according to established procedures</p> <p>2.4 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and established procedures</p> <p>2.5 Essential knowledge and associated skills are applied in an agreed timeframe and to quality standards efficiently according to requirements and established procedures</p>

ELEMENT	PERFORMANCE CRITERIA
	2.6 Solutions to non-routine problems are identified and actioned using essential knowledge and associated skills according to requirements
	2.7 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer to community and industry standards
3 Complete procedures monitoring and controlling field activities	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies are reported and solutions identified in accordance with established procedures
	3.2 Relevant work permit(s) and field activities are signed off and the status of plant, equipment and personnel movements recorded and handover procedures are conducted as per established procedures
	3.3 Shift handover detail is relayed and confirmed according to established procedures
	3.4 Work completion records, reports, documentation and information is confirmed, processed and the appropriate persons notified

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of monitoring and controlling field activities.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO46A Field staff activities – monitoring and control

Evidence shall show an understanding of field staff activities - monitoring and control to an extent indicated by the following aspects:

T1 Personal computer operating systems encompassing:

- Basic function, components and concepts
- Operating systems in use
- System installation and configuration

T2 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T3 Co-ordinating access authority procedures encompassing:

- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and co-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
- Techniques in facilitating and co-ordinating the delivery and issuing of access authorities

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific work site, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, regulatory requirements such as Occupational Health and Safety and electrical safety
- Techniques in the receiving and co-ordinating the cancellation of access authorities in readiness for restoration
- Methods of conducting audits on correct access authority procedures
- Process of issuing of other access authorities for work permits - working in confined space, if required, co-ordination of access authorities, engaging and briefing contractors on electrical and other work
- Issue and receipt of operating agreements.

T4 Implementation and monitoring requirements for the impact of powerline installations and operation on the environment and/or the area surrounding the powerline and/or equipment encompassing:

- Identification of relevant legislation, codes and government guidelines for the implementation and monitoring of environmental impact factors in the workplace and areas of power distribution or transmission - Commonwealth/State/Territory legislation relevant to the workplace and the Environment Protection Act legislation and common law
- Identification, assessment, control and monitoring of the hazards to the environment associated with the Powerline industry
- Workplace environment quality standards enterprise plan - setting of acceptable emission level limits from power plant equipment, impact of the enterprise activities on air and water quality, nature, impact and level of emissions from power plant, power distribution and transmission equipment and network infrastructure (noise generation, noxious gas emissions, greenhouse gas production, electromagnetic emissions, electromagnetic field strength, oil leakage, insulation breakdown products)
- Provision of manufacturers and suppliers information such as material safety data sheets (MSDSs)
- Gathering of environment management information
- Maintenance of environmental records
- Risk assessment and its management in Powerline industry
- Maintenance strategies for environment protection programs - developing processes for promoting, maintaining and improving environmental impact in the workplace and identify techniques for the evaluating and reviewing environment protection education and training programs and elements of an effective environment protection management system, EPA consultation and accident/incident investigations.

T5 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority

REQUIRED SKILLS AND KNOWLEDGE

regulations and or enterprise requirements associated with working on High Voltage

- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T6 HV system switching principles including switching authorisation procedures to an extent indicated by the following aspects:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of HV systems and equipment to be switched
- Procedures for obtaining correct HV switching authorisation - identification of OHS hazards, assessing and controlling risks, Safety procedures and precautions, safe approach distances
- responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, Requirements for team switching, procedures for coordination of operations.
- Techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures, energisation procedures

T7 LV system switching principles including switching authorisation procedures encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of LV systems and equipment to be switched
- Procedures for obtaining correct LV switching authorization - identification of OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching, procedures for coordination of operations.
- Techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures, energisation procedures.

T8 Coordinating and directing switching instructions encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching sheet instructions
- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the co-ordination and directing of switching schedules instructions
- Relationship between the operating authorities and HV customers, operating agreements
- Techniques in co-ordinating and directing HV and LV switching of electrical networks
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
- Responsibilities of the switching operator
- Techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures
- Techniques in gathering, collating and confirming data on switching procedures

T9 HV overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to HV overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment.
- Role and responsibilities of the HV switching operator
- Operational forms, access authorities and permits hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.
- Use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- HV switchgear – types, categories, application, operating capabilities.
- Operation of HV overhead switching or indicating devices - fuses; disconnect fuses; load switching; live line indicators; capacitors; reclosers; sectionalisers, underslung links, airbreaks; switches, disconnects; live line clamps; phasing sticks; phasing tester
- Operation of protection systems and substation equipment - fault levels and settings; types and applications; protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to HV switching equipment
- Procedures for the isolation of HV mains and working earths - earthing HV electrical apparatus practices and procedures for access authority issuing; HV switching techniques.
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

REQUIRED SKILLS AND KNOWLEDGE

T10 Low voltage overhead and substation switching principles encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to low voltage overhead and substation switching
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, use, characteristics and capabilities of specialised tools and testing equipment, role and responsibilities of the LV switching operator.
- Operational forms, access authorities and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments.
- Use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters, arc stranglers.
- LV switchgear – types, categories, application, operating capabilities
- Operation of LV overhead switching or indicating devices - fuses; disconnect fuses; load switching; underslung links, air break switches; disconnects; live line clamps; phasing sticks; phasing tester.
- Operation of protection systems and substation equipment - fault levels and settings; types and applications, protection systems and substation equipment fault levels and settings; types and applications.
- Restrictions pertaining to LV switching equipment
- Procedures for the isolation of LV distributions main and working earths
- Earthing LV electrical apparatus practices and procedures for access authority issuing
- Low voltage switching techniques
- Operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures, double isolation procedures.

T11 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

REQUIRED SKILLS AND KNOWLEDGE

T12 Enterprises specific — OHS instructions encompassing:

- Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the OHS policies and procedures
- Methods of obtaining the up-to-date information on enterprise OHS policy and procedures
- Specific enterprise personal protection equipment - type and application, where and when to be used, method of replacement, responsibility of maintenance including cleaning inspection and testing, emergency response, rescue, evacuation and First Aid procedures
- Personal well-being – hygiene, fatigue/stress management, drugs/alcohol
- OHS training - induction training, specific hazard training, specific task or equipment training, emergency and evacuation training, training as part of broader programs such as equipment operation
- OHS records including audits, inspection reports, workplace health and environmental monitoring records, training and instruction records, manufacturers and suppliers information such as MSDSs, registers, maintenance reports, workers compensation and rehabilitation records and First Aid/medical records

T13 Effective management and communication encompassing:

- Commonwealth, State/Territory and local government legislation, Standards, codes, supply authority regulations and or enterprise requirements applicable to assisting in effective management and communication
- Enterprise operational principles - workplace OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures, anti-discrimination policies and procedures.
- Relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to OHS training, methods of addressing barriers such as literacy and cultural differences and provisions relating to OHS issue resolution
- Techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management, range of support services and expertise available.
- Techniques in managing relationships - identifying problems, methods of conflict resolution, methods of consultation, communication, negotiation and mentoring, strategies for positive feedback.
- Techniques in leadership in achieving enterprise strategic and operational plans
- Techniques in managing relationships under stress - stress management.

Evidence Guide

EVIDENCE GUIDE

9) The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the ‘Assessment Guidelines — UET12’. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range
 - Apply sustainable energy principles and practices as specified in the performance criteria and range
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment
 - Demonstrate an appropriate level of employability skills
- Conduct work observing the relevant anti discrimination legislation, regulations, policies and workplace procedures
- Demonstrate performance across a representative range of contexts from the prescribed items below.

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All	Evaluate, respond and report threats to

		<p>systems operation/security</p> <p>Working knowledge of network functions including identification of abnormal conditions of the network and reporting</p> <p>Use relevant field permit to work systems</p> <p>Respond correctly to alarms</p> <p>Working knowledge of monitoring field work</p> <p>Communicate effectively in the workplace</p> <p>Operating communications equipment</p> <p>Interpret technical drawings and symbols</p> <p>Emergency Response procedures</p> <p>Work utilising relevant OHS legislation, regulations, codes of practice, policies and procedures</p> <p>Apply planning skills</p>
B	At least one occasion	Deal with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this Competency Standard Unit.
- Appropriate environmental regulation and work practices.
- Appropriate organisational requirements.
- Appropriate work environment, equipment and tools.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency in monitoring and controlling field activities.

Assessment of this competency must also be undertaken in either an actual workplace or under a simulated work environment. Assessment must also integrate the Employability Skills.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard covers the monitoring of permit to work requests, dispatching personnel, responding to alarms, travel and activity monitoring of field personnel, monitoring work activities of field personnel against work schedule, contingency skills, response to third party enquiries, out of hour, response to man down alarm, tracking of field personnel (remote area), monitoring activities on system equipment, monitoring availability of assets (maintain a log), monitor equipment status, coordinating field activities, controlling and authorising field works, preparing incident reports.

The following constants and variables included in the element/performance criteria in this unit are fully described in the Definitions Section of this volume and form an integral part of the Range Statement of this unit:

- Areas to be monitored
- Areas to control
- Electricity supply infrastructure
- Organisational requirements
- Records/reports
- Information systems
- Maps and drawings
- Established procedures

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Control centre.

UETTDRSO47A Coordinate high voltage transmission network

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the monitoring of HV transmission networks in real time. This includes power quality, alarm interpretation, facilitating and monitoring the status of access authorities and ensuring that the network is operated within design parameters at all times. It also includes dispatching and coordination of field repair crews to respond to and rectify abnormalities and liaise with other electrical authorities.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice**3)**

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems

Prerequisite Unit(s)	4)	
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRSO38A	Develop and evaluate power systems transmission switching programs

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the coordination of HV Transmission networks	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the coordination of HV Transmission networks, are reviewed and determined.
		1.2	Purpose of the coordination of the network is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the coordination of the network are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Testing parameters are established from organisational established procedures on policies and specifications.

ELEMENT**PERFORMANCE CRITERIA**

- | | |
|------|---|
| 1.6 | Work roles and tasks are allocated according to requirements and individuals' competencies. |
| 1.7 | Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures. |
| 1.8 | Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work. |
| 1.9 | Risk control measures are identified, prioritised and evaluated against the work schedule. |
| 1.10 | Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures. |
| 2 | Carry out the coordination of HV Transmission networks |
| 2.1 | Circuit/systems modelling is used to evaluate alternative proposals as per established procedures. |
| 2.2 | OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures. |
| 2.3 | Coordination decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures. |
| 2.4 | Mathematical and/or engineering models of the coordination process are used to analyse the effectiveness of the finished project as per requirements and established procedures. |
| 2.5 | Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative actions can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures. |
| 2.6 | Essential knowledge and associated skills are |

ELEMENT	PERFORMANCE CRITERIA
	<p>applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.</p> <p>2.7 Testing of coordination process is undertaken according to requirements and established procedures.</p> <p>2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.</p> <p>2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.</p> <p>2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.</p> <p>2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.</p>
<p>3 Complete the coordination of HV Transmission networks</p>	<p>3.1 Final review of the coordination processes is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of coordination documents are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of coordinating HV Transmission networks.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO47A High voltage transmission network - coordination

Evidence shall show an understanding of high voltage transmission network - coordination to an extent indicated by the following aspects:

T1 High voltage fault switching principles encompassing:

- Primary causes, effects and types of HV electrical faults
- HV protection devices - main components, types, categories, applications, functions
- Basic principle of operation of HV system protection devices
- Protection co-ordination and protection “zoning”
- HV feeder auto-reclosing suppression encompassing – function, application
- Circuit condition requirements and switching considerations when paralleling and separating HV feeders.

T2 Coordinating and directing switching instructions encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to switching sheet instructions
- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the co-ordination and directing of switching schedules instructions
- Relationship between the operating authorities and HV customers, operating agreements
- Techniques in co-ordinating and directing HV and LV switching of electrical networks
- Requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
- Responsibilities of the switching operator
- Techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, switching completion notification procedures

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in gathering, collating and confirming data on switching procedures

T3 AC transmission system components encompassing:

- Support structures and reasons for selection
- Insulators and reasons for selection
- Conductors and reasons for selection
- Vibration management systems and principles
- Line ratings based on voltage, span, tension and temperature

T4 AC transmission line models encompassing:

- Types of transmission line models based on line length
- Calculation of voltage drop, line regulation, and transmission efficiency
- Load sharing between lines

T5 Basic design features and characteristics of transmission structures and associated equipment and or components encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing of poles/structures and associated equipment and or components
- Transmission systems principles – terminologies, primary and secondary, voltage levels, types of lines
- Characteristics of structure - types of structure (towers and poles, concrete and steel), characteristics of types of structures, installation methods, maintenance techniques
- Characteristics of associated equipment used on structures – insulators, earthing (overhead earth and communication lines)

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Demonstrate on at least three (3) occasions the coordination of system manipulations that encompass:	<p>HV sub transmission and distribution network</p> <p>HV sub transmission and distribution network manipulation to control loading on equipment</p> <p>Transformers with HV windings (if applicable to enterprise equipment)</p> <p>HV busbars</p> <p>HV isolators</p> <p>HV switchgear (applicable to enterprise equipment).</p>
B	All of the following:	<p>Write switching instructions</p> <p>Check switching instructions</p> <p>Coordinate switching instructions</p> <p>Calculate plant loading</p> <p>Prepare and authorise HV sub transmission and distribution switching program</p> <p>Monitor switching progress</p> <p>Monitor the status of access permits/authorities on HV network equipment</p> <p>Ensure network plant operates within design and regulatory requirements on a real time basis</p> <p>Dispatch and communicate with field</p>

		<p>crews to respond/rectify system abnormalities</p> <p>Application and administration of SCADA (if applicable to enterprise equipment)</p> <p>Analyse and diagnose system failures</p> <p>Calculate and analyse paralleling conditions on the interconnected HV system</p>
C	Monitor and manage switching to:	<p>Manage load</p> <p>Manage voltage</p> <p>Minimise loss</p> <p>Maximise system reliability</p> <p>Allow safe network access for maintenance activities</p> <p>Allow safe network access for construction activities</p> <p>Validating fault reports arising from system disturbances</p>
D	At least one occasion	<p>Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.</p>

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual coordination of HV Transmission networks.

Note:

Access will be needed to: relevant protection, control, metering and alarm equipment, network drawings, computerised electrical plant control and monitoring facilities, operational event data, enterprise operational policies, procedures and work practices and crisis management procedures.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with units:

UETTDRSO38A Develop and evaluate power systems
transmission switching programs

UETTDRSO41A Manage power systems transmission networks

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the monitoring of HV Transmission networks, ensuring that the Transmission network is operated within design parameters at all times and shall be demonstrated using the following:

HV Transmission feeders/Transmission network; Transmission transformers with HV windings; HV busbars; HV isolators; HV switchgear (applicable to Transmission enterprise equipment); Switching instructions (applicable to Transmission enterprise equipment); computers (applicable to Transmission enterprise equipment); network diagrams (applicable to Transmission enterprise equipment); access authorities; regulatory requirements.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Hazards
- Identifying hazards
- Inspect
- Legislation
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 System Operation Units

UETTDRSO48A Respond to discrete and interdependent protection operations

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the coordination of response to discrete and interdependent protection operations due to system faults.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of

License to practice **3)**
operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic engineering computational problems

Prerequisite Unit(s)	4)	
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	Distribution and Subtransmission Pathway Unit Group	
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs
	UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks
	Transmission Pathway Unit Group	
	UETTDRSO38A	Develop and evaluate power systems transmission switching programs
	UETTDRSO47A	Coordinate high voltage transmission network

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the

following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan response to discrete/interdependent protection operations	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of the switching program, are reviewed and determined.
	1.2 Purpose of the response established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Established policies, procedures and specifications for the response are obtained or established with the appropriate personnel.
	1.4 Response to discrete/interdependent protection operations are discussed with and/or directed to

ELEMENT	PERFORMANCE CRITERIA
	the appropriate personnel in order to ascertain the scope of the work/testing required.
1.5	Testing parameters are ascertained from established policies, procedures and specifications.
1.6	Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
1.7	Work roles and tasks are allocated according to requirements and individuals' competencies.
1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
1.9	Liaison and communication issues with other/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work.
1.10	Risk control measures are identified, prioritised and evaluated against the work schedule.
1.11	Need for relevant work permits is identified to coordinate the performance of work according to requirements and/or established procedures.
1.12	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
1.13	Strategic plans are developed incorporating organisational initiatives as per established procedures
2	Carry out response to discrete/interdependent protection operations
2.1	OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
2.2	Decisions concerning the response to protection operations are made on the basis of safety and

ELEMENT	PERFORMANCE CRITERIA
	effective outcomes according to requirements and/or established procedures.
	2.3 Stakeholders/customers are kept informed of current status regarding plan progress and recent developments
	2.4 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.5 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the work within an agreed timeframe according to requirements.
	2.6 Testing of the decision to be implemented is undertaken according to requirements and established procedures.
	2.7 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
	2.8 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
	2.9 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
3 Complete the response to discrete/interdependent protection operations	3.1 Final review of the switching program is undertaken to ensure it complies with all requirements and include all specifications and documentations needed to complete the work.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents (electronic/paper) are

ELEMENT**PERFORMANCE CRITERIA**

finalised/commissioned.

- 3.3 Reports and/or completion documents (electronic/paper) are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of switching program documents (electronic/paper) are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing and evaluating transmission switching programs.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO48A Discrete and interdependent protection operations

Evidence shall show an understanding of discrete and interdependent protection operations to an extent indicated by the following aspects:

T1 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T2 Substations and power transformers encompassing:

- Relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
- Characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling
- Auxiliary equipment used on transformers - function and basic operation
- Maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault finding procedures
- Characteristics of a reactors - description and purpose

T3 High voltage fault switching principles encompassing:

- Primary causes, effects and types of HV electrical faults
- HV protection devices - main components, types, categories, applications, functions
- Basic principle of operation of HV system protection devices

REQUIRED SKILLS AND KNOWLEDGE

- Protection co-ordination and protection “zoning”
- HV feeder auto-reclosing suppression encompassing – function, application
- Circuit condition requirements and switching considerations when paralleling and separating HV feeders.

T4 Detailed operation and setting of discrete protection systems encompassing:

- Earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination, backup protection
- Overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination, backup protection
- Alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, over temperature schemes

T5 Detailed operation of interdependent protection systems encompassing:

- Overcurrent and earth leakage schemes including intertripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic, shading coils
- Pilot wire, phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme, pilot supervisory techniques,
- Load shedding, voltage control, parallel operation, load rejection
- Busbar Protection and CB failure protection
- Reclose systems - applications, single shot, multishot, blocking schemes, synchronisation checking.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Develop and evaluate, on at least three (3) occasions all of the following:	Identify discrete/interdependent relay operations by interpreting available alarms and event data. Analyse and diagnose system failures Evaluate response to discrete/interdependent relay operations
B	All of the following:	Describe control and alarms associated with discrete/interdependent protection systems
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual preparation of HV Transmission Switching programs

Note:

Access will be needed to: relevant modelling tools, drawings, computerised electrical plant control and monitoring facilities and

enterprise operational policies, procedures and work practices.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the activities required when responding to discrete/interdependent protection operations activities required to secure the network in the event of a fault condition and restoration plans which allow work to be safely performed whilst minimising customer outages and may include the following:

Overcurrent and Earth fault relays, Neutral displacement relays, No-volt changeover devices, Discrete auto reclose devices, DC Supplies, Oil surge devices (site maintenance), DC Frame leakage, Trip / control circuits, Alarms and indication, Voltage regulation relays, Parallel operation, Circuit isolation (discrete only) Function Tests (discrete only) Thermal overload , Transformer temperature control devices and CEL fail devices.

Conditions and facilities for the calculation of network loading, planning for the management of the network and multiple outages.

Regulatory and enterprise procedures for the compliance with national electricity code.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention

RANGE STATEMENT

- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

System Operation Units

UETTDRSO49A Coordinate power system operations in a regulated energy market

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the coordination of system operations in a regulated energy market. It includes the relevant application of knowledge of the National Electricity Market (NEM), the practices and rules used in facilitating the coordination of operations in a regulated energy market.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

License to practice **3)**
 Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic

Prerequisite Unit(s)	4)	
		engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	Distribution and Subtransmission Pathway Unit Group	
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs
	UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks
	Transmission Pathway Unit Group	
	UETTDRSO38A	Develop and evaluate power systems transmission switching programs
	UETTDRSO47A	Coordinate high voltage transmission network

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they

have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan to coordinate System Operations in a regulated energy market	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the coordination of the electricity market are reviewed and determined.
		1.2	Energy market requirements are established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Energy market and associated equipment operational prerequisites are identified and established in accordance with manufacturers

ELEMENT	PERFORMANCE CRITERIA
	and/or enterprise/site procedures
1.4	Electricity market coordination and control procedures are discussed with and/or directed to the appropriate personnel in order to ascertain the project brief.
1.5	Testing parameters are ascertained from established policies, procedures and specifications.
1.6	Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
1.7	Work roles and tasks are allocated according to requirements and individuals' competencies.
1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
1.9	Liaison and communication issues with other/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work.
1.10	Risk control measures are identified, prioritised and evaluated against the work schedule.
1.11	Need for relevant work permits is identified to coordinate the performance of work according to requirements and/or established procedures.
1.12	Circuit/systems modelling are used to evaluate alternative proposals as per established procedures.
2	Coordinate System Operations in a regulated energy market
2.1	Strategic plans are developed incorporating organisational initiatives as per established procedures
2.2	OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with

ELEMENT

PERFORMANCE CRITERIA

- requirements and/or established procedures.
- 2.3 Decisions concerning the coordination are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
- 2.4 Stakeholders/customers are kept informed of current status regarding plan progress and recent developments
- 2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the work within an agreed timeframe according to requirements.
- 2.7 Testing of the decision to be implemented is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the coordination of System Operations in a regulated energy market	<p>3.1 Final review of the coordination is undertaken to ensure it complies with all requirements and include all specifications and documentations needed to complete the work.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents (electronic/paper) are finalised/commissioned.</p> <p>3.3 Reports and/or completion documents (electronic/paper) are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of coordination documents (electronic/paper) are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing and evaluating transmission switching programs.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO49A Power system operations in a regulated energy market - coordination

Evidence shall show an understanding of power system operations in a regulated energy market - coordination to an extent indicated by the following aspects:

T1 Generation systems encompassing:

- Methods of generating electricity - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
- Relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
- The purpose and features of typical types of co-generation systems

T2 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T3 Enterprise specific procedures and work practices relating to managing network demand encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the procedures and work practices relating to managing network demand
- Requirements for the use of demand management manuals, system diagrams/plans and drawings
- Identify and interpret enterprise demand management procedures

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in the applying enterprise demand management procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to

safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Perform on at least three (3) occasions the following:	Dispatch energy to the electricity market Respond to electricity market fluctuations/demands Manipulate the system to ensure reliable operation in response to electricity market requirements
B	All of the following:	Principals and objectives of the electricity market The role of ancillary services in the operation of the electricity market Service provider obligations in the electricity market Connection and access requirements to the electricity market Analysis of pricing concepts Contractual obligations Scheduling of generation assets
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate

		solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake the operation of the power system within the NEM

Note:

Access will be needed to: relevant modelling tools, drawings, computerised electrical plant control and monitoring facilities and enterprise operational policies, procedures and work practices.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the knowledge of the structure, operation of the National Electricity Market and the impact of the National Electricity Rules on the operation of the power system.

It includes but it is not limited to a knowledge of dispatch of energy and ancillary services in the NEM, electrical market auto loading procedures; the ensuing flows and operation of the network, transmission plant loadings, stable system operation, planned and unplanned network outages, restoration of the system following system events, black system restart

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Assessing risk
- Assessment
- Authorisation
- Emergency
- Established procedures
- Legislation
- Notification
- OHS practices
- OHS issues
- Quality assurance systems
- Requirements
- Market participant
- Network service providers,
- Non market participants,
- Australian Energy Market Commission
- Australian Energy Regulator
- National Electricity Market Management Company

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
 System Operation Units

UETTDRSO50A Respond to complex power system protection operations

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the coordination of response to complex protection operations due to system faults.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of

License to practice **3)**
operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic engineering computational problems

Prerequisite Unit(s)	4)	
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRSO41A	Manage power systems transmission networks
	UETTDRSO48A	Respond to discrete and interdependent protection operations
	UETTDRSO49A	Coordinate power system operations in a regulated energy market
	Generation/Distribution and Subtransmission Pathway Unit Group	
	UETTDRSO34A	Control power systems generating plant
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs
	UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks

Prerequisite Unit(s)	4)
	Generation/Transmission Pathway Unit Group
	UETTDRSO34A Control power systems generating plant
	UETTDRSO38A Develop and evaluate power systems transmission switching programs
	UETTDRSO47A Coordinate high voltage transmission network
	Distribution and Subtransmission Pathway Unit Group
	UETTDRSO35A Manage high voltage distribution and subtransmission network demand
	UETTDRSO37A Develop high voltage distribution and subtransmission switching programs
	UETTDRSO40A Coordinate high voltage distribution and subtransmission networks
	Transmission Pathway Unit Group
	UETTDRSO38A Develop and evaluate power systems transmission switching programs
	UETTDRSO41A Manage power systems transmission networks
	UETTDRSO42A Manage power systems transmission network demand
	UETTDRSO47A Coordinate high voltage transmission network

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan response to complex protection operations	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of response to complex protection operations, are reviewed and determined.
		1.2	Purpose of the response is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Established policies, procedures and specifications for the response are obtained or established with the appropriate personnel.
		1.4	Response to complex protection operations are discussed with and/or directed to the appropriate personnel in order to ascertain the scope of the

ELEMENT	PERFORMANCE CRITERIA
	work/testing required.
	1.5 Testing parameters are ascertained from established policies, procedures and specifications.
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Need for relevant work permits is identified to coordinate the performance of work according to requirements and/or established procedures.
	1.12 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
2 Carry out response to complex protection operations	2.1 Strategic plans are developed incorporating organisational initiatives as per established procedures
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3 Decisions concerning the response to complex protection operations are made on the basis of safety and effective outcomes according to

ELEMENT	PERFORMANCE CRITERIA
	requirements and/or established procedures.
	2.4 Stakeholders/customers are kept informed of current status regarding plan progress and recent developments
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the work within an agreed timeframe according to requirements.
	2.7 Testing of the decision to be implemented is undertaken according to requirements and established procedures.
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
3 Complete the response to complex protection operations	<p>3.1 Final review of the response to complex protection operation is undertaken to ensure it complies with all requirements and include all specifications and documentations needed to complete the work.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents (electronic/paper) are finalised/commissioned.</p>

ELEMENT**PERFORMANCE CRITERIA**

- 3.3 Reports and/or completion documents (electronic/paper) are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of the response to complex protection operation documents (electronic/paper) are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing and evaluating transmission switching programs.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO50A Complex power system protection operations

Evidence shall show an understanding of complex power system protection operations to an extent indicated by the following aspects:

T1 Protection system types encompassing:

- Requirements of a protection scheme - relationship to primary system design, purpose of protection, safety of persons, protection of plant, system instability, system break up, loss of customers, loss of revenue, protection zones, restricted schemes, unrestricted schemes, duplicate protection, local backup protection, remote backup protection, selectivity, discrimination, stability, sensitivity, reliability
- Components of a protection scheme - current transformers, potential transformers, summation current transformers, interposing transformers, multitapped transformers, all-or-nothing relays, induction relays, balanced beam relays, directional relays, biased relays, solid state relays, microprocessor based relays, gas relays, thermal sensors, hardwired communication, powerline carriers systems, microwave systems, fibre optic systems, need for isolation, need for interfacing
- Protection applied to buses - overload, differential, earth leakage, structure leakage, combined schemes, protection overlap
- Protection applied to transformers - biased differential, gas, winding temperature, oil temperature
- Protection applied to single/radial lines - overcurrent, earth leakage, slow earth leakage, distance, auto reclose, sectionalising, over voltage
- Protection applied to interconnected lines - overcurrent, pilot wire, directional, directional overcurrent, current differential, phase comparison, current comparison, distance, impedance, admittance, offset.

T2 Use of fault information to analyse and develop optimal network restoration strategies encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the analysis of protection targeting
- Requirements for the use of operational manuals, system diagrams/plans and drawings
- Techniques in the collation of protection data
- Techniques in the analyse and assessment of fault information – public, employee,

REQUIRED SKILLS AND KNOWLEDGE

- protection equipment.
- Application methods of fault information to analyse and develop optimal network restoration strategies - public and employee safety, enterprise reliability guidelines.
- resource availability.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence

need to be ‘rich’ in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures;

and

- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Develop and evaluate, on at least three (3) occasions all of the following:	Identify complex relay operations by interpreting available alarms and event data. Analyse and diagnose system failures Evaluate response to complex relay operations
B	All of the following:	Describe control and alarms associated with complex protection systems
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a

workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual preparation of HV Transmission Switching programs

Note:

Access will be needed to: relevant modelling tools, drawings, computerised electrical plant control and monitoring facilities and enterprise operational policies, procedures and work practices.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the activities required when responding to complex protection operations as the result of a fault condition. These activities are required to secure the network and develop restoration plans that allow work to be safely performed whilst minimising customer outages and may include the following:

Complex: distance, differential, transformer differential, bus zone, bus overcurrent, revenue metering, current transformer accuracy, SCADA, communications, harmonic control, point on wave, HV plant testing.

Conditions and facilities for the calculation of network loading, planning for the management of the network and multiple outages.

Regulatory and enterprise procedures for the compliance with national electricity code.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect

RANGE STATEMENT

- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 System Operation Units

UETTDRSO51A Manage network systems power flows

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the management of electrical network active and reactive power flows ensuring the network is operated within design parameters at all times. The electrical network includes feeders from distribution to transmission voltages; substation and generation assets that can influence power flows.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government

License to practice**3)**

legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic engineering computational problems

Prerequisite Unit(s)	4)	
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRSO32A	Manage power systems network faults
	UETTDRSO41A	Manage power systems transmission networks
	UETTDRSO48A	Respond to discrete and interdependent protection operations
	UETTDRSO49A	Coordinate power system operations in a regulated energy market
	UETTDRSO50A	Respond to complex power system protection operations
	Generation/Distribution and Subtransmission Pathway Unit Group	
	UETTDRSO34A	Control power systems generating plant
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching

Prerequisite Unit(s)	4)	
		programs
	UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks
	Generation/Transmission Pathway Unit Group	
	UETTDRSO34A	Control power systems generating plant
	UETTDRSO38A	Develop and evaluate power systems transmission switching programs
	UETTDRSO47A	Coordinate high voltage transmission network
	Distribution and Subtransmission Pathway Unit Group	
	UETTDRSO35A	Manage high voltage distribution and subtransmission network demand
	UETTDRSO37A	Develop high voltage distribution and subtransmission switching programs
	UETTDRSO40A	Coordinate high voltage distribution and subtransmission networks
	Transmission Pathway Unit Group	
	UETTDRSO38A	Develop and evaluate power systems transmission switching programs
	UETTDRSO41A	Manage power systems transmission networks
	UETTDRSO42A	Manage power systems transmission network demand
	UETTDRSO47A	Coordinate high voltage transmission network
Literacy and numeracy skills	4.2)	

Participants are best equipped to achieve this unit if they

have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan to manage network power flows	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence preparation of any network power flow management decisions are reviewed and determined.</p> <p>1.2 Purpose of the management is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Organisational established policies, procedures and specifications for the management of network power flows are obtained or established</p>

ELEMENT	PERFORMANCE CRITERIA
	with the appropriate personnel.
	1.4 Network power flow management decisions are discussed with and/or directed to the appropriate personnel in order to ascertain the system conditions.
	1.5 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.6 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.7 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.8 Liaison and communication issues with other/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work.
	1.9 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.10 Need for relevant operating procedures are identified to manage the performance of the network according to requirements and/or established procedures.
	1.11 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
2 Carry out and management network power flow	<p>2.1 Strategic plans are developed incorporating organisational initiatives as per established procedures</p> <p>2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.</p> <p>2.3 Management decisions are made on the basis of safety and effective outcomes according to</p>

ELEMENT	PERFORMANCE CRITERIA
	requirements and/or established procedures.
	2.4 Stakeholders/customers are kept informed of current status regarding plan progress and recent developments
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the work within an agreed timeframe according to requirements.
	2.7 Testing of management decisions is undertaken according to requirements and established procedures.
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
3 Complete the management of network power flow	3.1 Final review of management decisions are undertaken to ensure it complies with all requirements and include all specifications and documentations needed to complete the work.
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents (electronic/paper) are finalised/commissioned.
	3.3 Reports and/or completion documents (electronic/paper) are submitted to relevant

ELEMENT**PERFORMANCE CRITERIA**

personnel/organisations for approval and, where applicable, statutory or regulatory approval.

- 3.4 Where applicable, approved copies of power flow management documents (electronic/paper) are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing and evaluating transmission switching programs.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TSO51A Network systems power flows - management

Evidence shall show an understanding of network systems power flows – management to an extent indicated by the following aspects:

T1 Enterprise specific procedures and work practices relating to managing network demand encompassing:

- Commonwealth, State/Territory and local government legislation, supply authority regulations Standards, codes, and or enterprise requirements applicable to the procedures and work practices relating to managing network demand
- Requirements for the use of demand management manuals, system diagrams/plans and drawings
- Identify and interpret enterprise demand management procedures
- Techniques in the applying enterprise demand management procedures

T2 Voltage control techniques encompassing:

- Conditions leading to voltage collapse
- Effects on system of high and low voltage
- Voltage control devices - voltage regulators applied to generators and synchronous phase modifiers, electromagnetic voltage regulators, series and parallel capacitors, OLTC transformers and static VAR compensators (SVC's). SVC's includes saturated reactor compensators; thyristor controlled reactor compensators and combined systems
- Production of harmonics and methods of harmonic control
- Location of voltage control devices within the system.

T3 Power flow control encompassing:

- Use of system components to control power flow patterns - base load, spinning reserve, regulating machines, rapid start plant, phase shifting transformers and load shedding
- Principles of automated control
- Synchronising power
- Relationship of power and frequency
- Machine stabilisation techniques
- System oscillations and stability - damped and undamped oscillation, relationship of fault clearance times and system stability, critical clearance times.

REQUIRED SKILLS AND KNOWLEDGE

T4 Alternators operation and control encompassing:

- Constructional features of alternators - weights, lengths, lengths, cooling mediums, cooling systems, prime mover types, prime mover attachment, types of windings, core arrangements
- Principle of operation - induction machines, synchronous machines
- Modes of operation - island and infinite bus operation, running up of prime movers, loading the alternator, requirements for synchronising, methods of synchronising
- Use of reactive capability diagram - related diagram types, current circle diagram, performance chart, capability diagram, values represented, per unit representation, limits representation and meaning
- Automatic voltage regulators - need for voltage control, required attributes of an AVR, range, response time, constraints on AVR capability, desirable attributes of an AVR, power consumption, compensation, rotor stabilisation, automatic changeover systems, input and output requirements and components.
- Operation on an infinite bus - definition of infinite bus, power/angle dependence, reactive flow/voltage dependence, power/angle diagram, effect of saliency, transient conditions, practical and theoretical stability limits, voltage dependence of stability, control of reactive flow using AVR and generator transformer tap changer

T5 EHV generator control systems encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the operation of a portable generator
- Safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, synchronising procedures
- Techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load, assessing the appropriateness of the generator
- Operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations, kiosk substations
- EHV generator set and control system to EHV Distribution assets.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Develop and evaluate, on at least three (3) occasions network manipulations that encompass the following:	Maximise system reliability Manage voltage Minimise loss Control load Dispatch of Static/Synchronous VAR compensation (if applicable to enterprise) Dispatch of generation (if applicable to enterprise)
B	Demonstrate calculations and analyse the following:	Transmission line conditions on the interconnected EHV system. Distribution and Subtransmission line conditions on an interconnected system
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual preparation of HV Transmission Switching programs

Note:

Access will be needed to: relevant modelling tools, drawings, computerised electrical plant control and monitoring facilities and enterprise operational policies, procedures and work practices.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the management of network power flows. These activities are required to secure the network, ensure the network operates at maximum efficiency and develop plans allowing work to be performed safely and shall be demonstrated using the following:

EHV transmission network; HV distribution and sub transmission network; transformers with EHV windings; transformers with HV windings; EHV and HV busbars; EHV and HV isolators; EHV and HV Switchgear (applicable to enterprise equipment); switching of reactors or capacitors into circuit; electricity market auto loading procedures; generator excitation systems; prime mover governing system; fuel delivery systems; switching instructions (applicable to enterprise equipment); computers (applicable to enterprise equipment); network diagrams (applicable to enterprise equipment); access authorities; regulatory requirements

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect

RANGE STATEMENT

- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 System Operation Units

UETTD RTP22A Establish and reinstate a power systems transmission structure work site

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the operation/maintenance of support plant and equipment and tools used for excavation work associated with foundations and footings for the construction of transmission towers. It also covers the preparation of the work site and the reinstatement of the ground surface. Scope of maintenance includes and is limited to visual inspection; lubrication; gland nipping; draining of water taps; degreasing; replacing gaskets. Use of relevant personal protective equipment is required.

Application of the Unit

Application of the Unit 2)

This Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice

3)

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to establish and or restore a transmission tower work site schedule of work	1.1	Work instructions are identified, received and confirmed.
	1.2	Relevant requirements, specifications and priorities are set as per procedures to establish and confirm the work schedule.
	1.3	OHS policies and procedures to be followed for the work to be performed are received and confirmed.
	1.4	Suggestions to assist with the establishing/restoration of the work site are made to others involved in the work.
	1.5	Hazards are identified, OHS risks assessed and emergency exits kept clear according to given instructions and established procedures.
	1.6	Scope of responsibility under the relevant work permit, where appropriate, are received and confirmed according to requirements and

ELEMENT

PERFORMANCE CRITERIA

- established procedures with relevant persons.
- 1.7 Resources including equipment, tools, drawings, notices and personal protective equipment required for the job are identified and checked for working order according to established procedures.
 - 1.8 Relevant responsibilities associated with first aid and other related work safety procedures at the work site are checked and confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident.
 - 1.9 Client issues are referred to appropriate persons in accordance with industry/acceptable /community standards.
 - 1.10 Site preparation is confirmed according to given instructions, as is the site safety plan and the work schedule for a quality outcome and to minimise risk and damage to property, commerce and individuals in accordance with established procedures.
 - 1.11 Road signs, barriers and warning devices are confirmed as positioned in accordance with given instructions and requirements.
- 2 Establish and/or restore the work site schedule of work
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste associated with establishing/restoring the work site and/or using of plant and equipment, are followed, in accordance with given instructions, requirements and/or established procedures.
 - 2.2 Site hazards such as lifting, climbing, working in confined spaces and/or aloft, and use of power tools/equipment, techniques and practices are safely followed in accordance with given instructions and according to requirements confirmed to eliminate the prospects of incidents.
 - 2.3 Operational knowledge for

ELEMENT

PERFORMANCE CRITERIA

- establishing/restoration of the work site and for operating support plant and equipment is confirmed to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements and established procedures.
- 2.4 Establishing/restoring the work site and operating support plant and equipment is used safely and carried out in accordance with given instructions and established procedures to ensure all process aspects of the work are confirmed.
- 2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.6 Non-routine events are referred to the immediate authorised persons for directions according to established procedures.
- 2.7 Problems associated with establishing/restoring the work site and the operation of support plant and equipment are dealt with using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met.
- 2.8 Ongoing checks of quality of the work are undertaken and work is completed within an allocated timeframe in accordance with given instructions and established procedures.
- 3 Review and document establishment and/or restoration of work site schedule of work
- 3.1 Work undertaken is checked against work schedule and anomalies reported to authorised persons in accordance with established procedures.
- 3.2 Accidents and/or incidents are actioned and reported to authorised persons in accordance with established procedures.
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with given instructions and

ELEMENT

PERFORMANCE CRITERIA

established procedures.

- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Appropriate persons are notified of work completion according to established procedures.
- 3.6 Work completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.
- 3.7 Performance feedback is sought to confirm outcomes are in agreement with work requirements and specifications.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of establishing and reinstating a transmission tower work site.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP22A Power systems transmission structure work site

Evidence shall show an understanding of the power systems transmission structure work site to an extent indicated by the following aspects:

T1 Hand tools and their use encompassing:

- Hand tools for cutting, shaping, drilling, threading, tapping, and finishing metallic and non-metallic components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, care and maintenance of hand tools.
- Tools for measuring and marking out - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, care and maintenance of hand tools
- Tools for dismantling and assembling electrical and electronic components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, care and maintenance of hand tools.

T2 Fixed and portable tools and their use encompassing:

- Fixed power tools for cutting, shaping, drilling, and finishing metallic and non-metallic components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, care and maintenance of fixed power tools.
- Portable power tools for cutting, shaping, drilling, and structural components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, care and maintenance of fixed power tools, requirements for use on construction sites.

T3 Materials properties encompassing:

- Identification and classification of engineering materials material properties
- Types and applications - properties of tensile strength, effects of temperature on the expansion of metals, ductibility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers.

T4 Requirements for the use of enterprise vehicles such as, trucks and four wheel drives encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with safe use of enterprise vehicles including relevant certification and licensing such as motor cars, light and heavy commercial trucks,

REQUIRED SKILLS AND KNOWLEDGE

heavy truck/trailer combination, four wheel drive vehicles.

- Compliance with regulations associated with the securing of loads prior for transportation.

T5 Requirements for the use of chain saws including relevant certification and licensing encompassing:

- Safety precautions, requirements and responsibilities
- Selection and use of appropriate personal protective equipment
- Chain saw operation - parts and function of components and ancillary equipment, pre-operational checks, starting procedures, safe use of chain saw under load.
- Safe transporting and storage procedures.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may

be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated

- environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following	<p>Using plans, drawings, maps/work schedule define work to be completed, indicating OHS and environmental issues/hazards.</p> <p>Verify qualifications to operate machinery and perform machinery daily log checks.</p> <p>Submit Dial Before You dig application form.</p> <p>Verify understanding of material safety data sheets (MSDS) and work permits.</p> <p>Undertake appropriate traffic control management</p> <p>Verify an understanding of working safely with hazardous materials and equipment, safe manual handling techniques and correct</p>

		use of personal protective equipment.
B	Operate at least 5 of the following	Small generator sets Welding units Air Compressors and hoses Pneumatic and/or electric hammers Rollers and compactors Concrete and ceramic cutters Pumps Post hole diggers Drills
C	Operate at least one of the following	Back hoes Earth drilling rigs Trench excavators Heavy vehicles
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to undertake actual installation and maintenance on de-energised low voltage underground polymeric cables.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTD RTP2 Erect power systems transmission structures
3A

UETTD RTP2 Erect power systems transmission structure
4A hardware

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to establishing and/or restoring the work site using support plant, equipment and tools to perform work in a utilities industry work environment.

Support plant may include back hoes, earth drilling rigs, trench excavators, heavy vehicles, wood-chippers, concrete cutters, air compressors, portable generators, welders, crimper-cutters, pumps, chain-saws, post hole diggers, sand-blasters, pneumatic and/or electric hammers, rollers and compactor, concrete and ceramic cutters, boring equipment, trenching equipment and drills.

Equipment may include hand operated ratchet and friction grip winches, chain pullers and block and tackle.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Authorisation
- Confined space
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Quality assurance systems
- Requirements
- Work clearance systems.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Transmission Units

UETTD RTP23A Erect power systems transmission structures

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the erection of towers in sections or in parts, in accordance with construction plans and specifications. It includes the correct positioning of road signs, barriers and or warning devices, the inspection and confirmation that excavation/foundation construction is in accordance with the works order and the identification of potential hazards and safety risks with recommendations for preventative action being referred to appropriate authorities.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice**3)**

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to erect transmission towers	1.1 Work instructions are received and confirmed. 1.2 Relevant requirements and established procedures to be followed for the work to be performed are discussed with all personnel to establish and confirm the work schedule. 1.3 OHS policies and procedures to be followed for the work to be performed are received and confirmed. 1.4 Suggestions to assist in meeting erection of towers outcomes are made to others involved in the work. 1.5 Hazards are identified, OHS risks assessed and emergency exits kept clear according to given instructions and established procedures. 1.6 Scope of responsibility under the relevant work permit are received and confirmed according to requirements and established procedures with

ELEMENT**PERFORMANCE CRITERIA**

- relevant personnel.
- 1.7 Resources including, equipment, tools and personnel protective equipment required for the job are obtained and, in working order according to established procedures.
- 1.8 Relevant responsibility associated with First Aid, Tower/Pole Top Rescue and/or other related work safety procedures at the work site are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident.
- 1.9 Client issues are referred to appropriate personnel in accordance with industry/acceptable /community standards.
- 1.10 Site is prepared according to given instructions and the work schedule for a quality outcome and to minimise risk and damage to property, commerce, and individuals in accordance and established procedures.
- 1.11 Road signs, barriers and warning devices are positioned in accordance with given instructions and requirements.
- 2 Carry out the erection of transmission towers.
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures.
- 2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed in accordance with given instructions and, according to requirements confirmed to eliminate the prospects of incidents.
- 2.3 Operational knowledge for the operation of support plant and equipment used for the erection of towers to be applied to the work is confirmed to ensure completion in an agreed timeframe and, to quality standards with a

ELEMENT	PERFORMANCE CRITERIA
	<p>minimum of waste according to requirements and established procedures.</p>
	<p>2.4 Operation of support plant and equipment used for the erection of towers is carried out in accordance with given instructions and established routines/procedures.</p>
	<p>2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p>
	<p>2.6 Non-routine events are referred to the immediate authorised personnel for directions according to established procedures.</p>
	<p>2.7 Problems associated with operation of support plant and equipment used for the erection of towers are dealt with using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met.</p>
	<p>2.8 Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures.</p>
<p>3 Complete the erection of transmission towers</p>	<p>3.1 Work undertaken is checked against work schedule and anomalies reported to Authorised personnel in accordance with established procedures.</p>
	<p>3.2 Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures.</p>
	<p>3.3 Work site is rehabilitated, cleaned up and made safe in accordance with given instructions and established procedures.</p>
	<p>3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.</p>

ELEMENT**PERFORMANCE CRITERIA**

- 3.5 Appropriate personnel are notified of work completion according to established procedures.
- 3.6 Works completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of erecting transmission towers.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP23A Power systems transmission structure erection

Evidence shall show an understanding of the erection of power systems transmission structures to an extent indicated by the following aspects:

T1 Hand tools and their use encompassing:

- Hand tools for cutting, shaping, drilling, threading, tapping, and finishing metallic and non-metallic components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, care and maintenance of hand tools.
- Tools for measuring and marking out - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, care and maintenance of hand tools
- Tools for dismantling and assembling electrical and electronic components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, care and maintenance of hand tools.

T2 Fixed and portable tools and their use encompassing:

- Fixed power tools for cutting, shaping, drilling, and finishing metallic and non-metallic components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, care and maintenance of fixed power tools.
- Portable power tools for cutting, shaping, drilling, and structural components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, care and maintenance of fixed power tools, requirements for use on construction sites.

T3 Materials properties encompassing:

- Identification and classification of engineering materials material properties
- Types and applications - properties of tensile strength, effects of temperature on the expansion of metals, ductibility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers.

T4 Transmission structures and hardware encompassing:

- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Types of structures

REQUIRED SKILLS AND KNOWLEDGE

- Types and function of associated hardware/equipment and insulators
- Types of conductors
- Location of transmission structures
- Other equipment used on transmission structures, e.g. aircraft warning devices
- Voltages on transmission structures

T5 Enterprises specific — technical drawing and documents encompassing:

- Types and application of enterprise specific drawings and documents - electrical and electronic drawings, mechanical drawings, project charts, schedules, graphs, technical manuals and catalogues
- Instruction/worksheets sheets - types and application of enterprise specific symbols and diagrams
- Title box - description of parts and version control.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an

extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and

- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least one of the following:	Pyramid Delta Pi Enterprise specific types
B	At least one of the following:	Mass concrete Caisson or pile-based Screw-anchor Bored
C	At least one of the following:	Crane Gin pole
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance on de-energised low voltage underground polymeric cables.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTD RTP2 Establish and reinstate a power systems

2A transmission structure work site

UETTD RTP2 Erect power systems transmission structure

4A hardware

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to erection of transmission towers.

Tower types may include pyramid, delta and pi and other enterprise specific types.

Methods of erection may include crane and/or gin pole.

Foundations may include mass concrete, caisson or pile-based and screw-anchor or bored types

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements

RANGE STATEMENT

- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Transmission Units

UETTD RTP24A Erect power systems transmission structure hardware

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the erection of hardware and/or associated equipment used on transmission towers. It includes the correct positioning of hardware on the towers in accordance with construction plans and specifications. It also encompasses the inspection and confirmation that the hardware and associated equipment are in accordance with the works order and the identification of potential hazards and safety risks with recommendations for preventative action being referred to appropriate authorities.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice**3)**

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures
UETTD RTP23A	Erect power systems transmission structures

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to erect transmission tower hardware	1.1	Work instructions are received and confirmed.
		1.2	Relevant requirements and established procedures to be followed for the work to be performed are discussed with all personnel to establish and confirm the work schedule.
		1.3	OHS policies and procedures to be followed for the work to be performed are received and confirmed.
		1.4	Suggestions to assist in meeting the erection of transmission tower hardware outcomes are made to others involved in the work.
		1.5	Hazards are identified, OHS risks assessed and emergency exits kept clear according to given

ELEMENT**PERFORMANCE CRITERIA**

- instructions and established procedures.
- 1.6 Scope of responsibility under the relevant work permit are received and confirmed according to requirements and established procedures with relevant personnel.
- 1.7 Resources including, equipment, tools and personnel protective equipment required for the job are obtained and, in working order according to established procedures.
- 1.8 Relevant responsibility associated with First Aid, Tower/Pole Top Rescue and/or other related work safety procedures at the work site are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident.
- 1.9 Client issues are referred to appropriate personnel in accordance with industry/acceptable /community standards.
- 1.10 Site is prepared according to given instructions and the work schedule for a quality outcome and to minimise risk and damage to property, commerce, and individuals in accordance and established procedures.
- 1.11 Road signs, barriers and warning devices are positioned in accordance with given instructions and requirements.
- 2 Carry out the erection of transmission tower hardware
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures.
- 2.2 Lifting, climbing, working in confined spaces and/or aloft, and use of power tools/equipment, techniques and practices are safely followed in accordance with given instructions and, according to requirements confirmed to eliminate the prospects of incidents
- 2.3 Operational knowledge for the erection of

ELEMENT**PERFORMANCE CRITERIA**

- transmission tower hardware to be applied to the work is confirmed to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements and established procedures.
- 2.4 The erection of transmission tower hardware is carried out in accordance with given instructions and established routines/procedures.
- 2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.6 Non-routine events are referred to the immediate authorised personnel for directions according to established procedures.
- 2.7 Problems associated with the erection of transmission tower hardware are dealt with using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met.
- 2.8 Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures.
- 3 Complete the erection of transmission tower hardware
- 3.1 Work undertaken is checked against work schedule and anomalies reported to Authorised personnel in accordance with established procedures.
- 3.2 Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures.
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with given instructions and established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.

ELEMENT**PERFORMANCE CRITERIA**

- 3.5 Appropriate personnel are notified of work completion according to established procedures.
- 3.6 Works completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of erecting transmission tower hardware.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP24A Power systems transmission structure hardware erection

Evidence shall show an understanding of the erection of power systems transmission structure hardware to an extent indicated by the following aspects:

T1 Requirements for the use of enterprise vehicles such as, trucks and four wheel drives encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with safe use of enterprise vehicles including relevant certification and licensing such as motor cars, light and heavy commercial trucks, heavy truck/trailer combination, four wheel drive vehicles.
- Compliance with regulations associated with the securing of loads prior for transportation.

T2 Generation systems encompassing:

- Methods of generating electricity - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
- Relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
- The purpose and features of typical types of co-generation systems.

T3 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least one of the following:	Pyramid Delta Pi Enterprise specific types
B	At least one of the following:	Insulators Bolts Clamps
C	At least one of the following:	Crane Gin pole
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance on de-energised low voltage underground polymeric cables.

In addition to the resources listed above in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment**9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units**9.5)**

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTD RTP2 Establish and reinstate a power systems
2A transmission structure work site

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to erection of transmission tower hardware.

Tower types may include pyramid, delta and pi and other enterprise specific types.

Associated hardware may include insulators and associated bolts and clamps.

Methods of erection may include crane and/or gin pole.

Foundations may include mass concrete, caisson or pile-based and screw-anchor or bored types.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems

RANGE STATEMENT

- Requirements
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Transmission Units

UETTD RTP25A Pre-tension stringing overhead transmission conductors and cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the stringing of overhead conductors and cables with no electrical connections being made. It includes the preparation of the site, the pre-positioning of conductors and fitting of conductor/cable stringing equipment where appropriate and the cleaning of insulators in accordance with works order.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice

3)

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101 A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13 A	Comply with sustainability, environmental and incidental response policies and procedures
UETTD RTP23 A	Erect power systems transmission structures
UETTD RTP24 A	Erect power systems transmission structure hardware

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare to pre-tension string the transmission overhead conductors and cables	1.1	Work instructions are received and confirmed.
		1.2	Relevant requirements and established procedures to be followed for the work to be preformed are discussed with all personnel to establish and confirm the work schedule.
		1.3	OHS policies and procedures to be followed for the work to be performed are received and confirmed.
		1.4	Suggestions to assist in meeting pre-tension stringing of transmission overhead conductors and cables outcomes are made to others involved in the work.
		1.5	Hazards are identified, OHS risks assessed and

ELEMENT

PERFORMANCE CRITERIA

- emergency exits kept clear according to given instructions and established procedures.
- 1.6 Scope of responsibility under the relevant work permit are received and confirmed according to requirements and established procedures with relevant personnel.
- 1.7 Resources including, equipment, tools and personnel protective equipment required for the job are obtained and, in working order according to established procedures.
- 1.8 Relevant responsibility associated with First Aid, Tower/Pole Top Rescue and/or other related work safety procedures at the work site are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident.
- 1.9 Client issues are referred to appropriate personnel in accordance with industry/acceptable /community standards.
- 1.10 Site is prepared according to given instructions and the work schedule for a quality outcome and to minimise risk and damage to property, commerce, and individuals in accordance and established procedures.
- 1.11 Road signs, barriers and other warning devices are positioned in accordance with given instructions and requirements.
- 2 Carry out pre-tension stringing of transmission overhead conductors and cables
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures.
- 2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed in accordance with given instructions and, according to requirements confirmed to eliminate the prospects of incidents.

ELEMENT	PERFORMANCE CRITERIA
2.3	Operational knowledge for the pre-tension stringing of transmission overhead conductors and cables to be applied to the work is confirmed to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements and established procedures.
2.4	Pre-tension stringing of transmission overhead conductors and cables is carried out in accordance with given instructions and established routines/procedures.
2.5	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
2.6	Non-routine events are referred to the immediate authorised personnel for directions according to established procedures.
2.7	Problems associated with pre-tension stringing of transmission overhead conductors and cables are dealt with using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met.
2.8	Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures.
3 Complete pre-tension stringing of transmission overhead conductors and cables	3.1 Work undertaken is checked against work schedule and anomalies reported to authorised personnel in accordance with established procedures.
	3.2 Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with given instructions and established procedures.

ELEMENT

PERFORMANCE CRITERIA

- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Appropriate personnel are notified of work completion according to established procedures.
- 3.6 Works completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of pre-tension stringing transmission overhead conductors and cables.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP25A Overhead transmission conductors and cables - stringing

Evidence shall show an understanding of the stringing (pre-tension) of overhead transmission conductors and cables to an extent indicated by the following aspects:

T1 Stringing installation overhead transmission conductors and cables encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to stringing conductors and cables
- Requirements for the use of overhead line construction manuals, system diagrams/plans and drawings, material lists.
- Conductor size, type and route length
- Constructions types and structures for transmission lines
- Types, sizes and characterises of overhead conductors
- Resources for the stringing of conductors, - personal protective equipment, plant, tools and equipment
- Techniques in stringing conductors - safe working practices, method of conductor support, consideration for the environment, location/positioning of the conductor/cable, types and application of tools, equipment and hardware.
- Methods of stringing conductors.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Any 2 of the following:	Copper Aluminium Steel Aluminium/steel reinforced HV ABC HV IUC
B	Any one of the following:	EWP Winches/capstans Tension equipment Stringing equipment Cable trailers Cable drum stands Ropes Rollers Sheaves Stockings Swivels
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a

workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake pre-tension stringing transmission overhead conductors and cables.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the pre-tension stringing of transmission overhead conductors and cables in accordance with relevant enterprise safe working practices/procedures and environmental requirements, manufacturers specifications, codes of practice, statutory requirements, Australian Standards and Occupational Health and Safety standards.

Types of conductors and cables may include copper, aluminium, steel, aluminium conductor steel reinforced.

Stringing may be required to be carried out for all the types of conductors and cables listed above.

Plant may include elevating work platform, winches and capstans, specialist tension stringing equipment, cable trailers and cable drum stands. Other stringing equipment may include ropes, rollers and sheaves, stockings and swivels.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Transmission Units

UETTD RTP26A Install transmission structures and associated hardware

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the erection of non-energised, pyramid, delta, Pi or enterprise specific transmission towers and associated hardware. It includes the erection of components in accordance with construction plans, specifications, work orders and standing enterprise requirements. Erection could also involve cleaning and welding. The updating of system data, records and or completion of relevant documentation in accordance with enterprise requirements also forms part of this competency.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice**3)**

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

- | | |
|---|--|
| 1 Prepare to erect transmission towers and associated hardware | 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection. |
| | 1.2 Relevant requirements and established procedures for the work are communicated to all |

ELEMENT**PERFORMANCE CRITERIA**

- personnel and identified for all work sites.
- 1.3 OHS policies and procedures related to requirements and established procedures for the erect towers and associated hardware are obtained and confirmed for the purposes of the work to be performed and communicated.
 - 1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
 - 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
 - 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
 - 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
 - 1.8 Relevant personnel at work site are confirmed current in First Aid, Tower/Pole Top Rescue and other related work procedures according to requirements.
 - 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
 - 1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
 - 1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA
	1.12 Traffic management plan is identified and implemented.
2 Carry out the erection of transmission towers and associated hardware	2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Essential knowledge and associated skills are applied in the safe erection of towers and associated hardware to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.4 Towers and associated hardware to be erected are stabilised according to requirements.
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6 Erection of towers and associated hardware is carried out, in accordance with the work schedule and requirements/established procedures.
	2.7 Unplanned events in the erection of towers and associated hardware are undertaken within the scope of established procedures.
	2.8 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.9 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the erection of transmission towers and associated hardware	<p>3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.</p> <p>3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.</p> <p>3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.</p> <p>3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures.</p> <p>3.5 Relevant work permit(s) are signed off and, towers and associated hardware are returned to service in accordance with requirements.</p> <p>3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of erecting transmission towers and associated hardware.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP26A Transmission structures and hardware

Evidence shall show an understanding of transmission structures and hardware to an extent indicated by the following aspects:

- T1 Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- T2 Types of structures
- T3 Types and function of associated hardware/equipment and insulators
- T4 Types of conductors
- T5 Location of transmissions structures
- T6 Other equipment used on transmission structures, e.g. aircraft warning devices
- T7 Voltages on transmission structures
- T8 Traffic management
 - Note: Examples include purpose of traffic management and a power worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- T9 Classification and identification of equipment, components and tools
- T10 Procedures for purchasing/ordering items, removing/dispatching items, stocktaking, and record keeping
- T11 Safe working practices encompassing:
 - Requirements to enable safe working on conductive poles
 - Safe working practices when working with associated hardware/equipment and insulators
 - Precautions of voltages on transmission structures
 - Safe working practices when using specialised equipment

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and;
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Any one of the following:	Pyramid Delta pi Enterprise specific type
B	At least two of the following:	Insulators Clamps Bolts Structural components
C	At least one of the following:	Welding Cleaning
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual erection of towers and associated equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

**Method of
assessment****9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units****9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the erection of non-energised, pyramid, delta, Pi or enterprise specific towers in accordance with construction plans and specifications

Tower types may include pyramid, delta and pi and other enterprise specific types.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems

RANGE STATEMENT

- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Transmission Units

UETTD RTP27A Maintain transmission structures and associated hardware

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of non-energised, pyramid, delta, Pi or enterprise specific transmission towers and associated hardware. It includes the repair, and or replacement of components in accordance with construction plans, specifications, work orders and standing enterprise requirements. Maintenance could also involve cleaning and welding. The updating of system data, records and or completion of relevant documentation in accordance with enterprise requirements also forms part of this competency.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice**3)**

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus
UETTD RTP26A	Install transmission structures and

Prerequisite Unit(s) 4)

associated hardware

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to maintain transmission towers and associated hardware	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 OHS policies and procedures related to requirements and established procedures for the maintenance of towers and associated hardware are obtained and confirmed for the purposes of the work to be performed and communicated.
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
	1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
	1.7 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
	1.8 Relevant personnel at work site are confirmed current in First Aid, Pole Tower/Top Rescue and other related work procedures according to requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Site is prepared according to the work schedule

ELEMENT**PERFORMANCE CRITERIA**

		and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.12	Traffic management plan is identified and implemented.
2	Carry out the maintenance of transmission towers and associated hardware	
	2.1	OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2	Towers and associated hardware to be erected are stabilised according to requirements.
	2.3	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.4	Essential knowledge and associated skills are applied in the safe erection of towers and associated hardware to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.6	Maintenance, including repair and/or replacement of towers is carried out, in accordance with the work schedule and requirements/established procedures.
	2.7	Unplanned events in the erection of towers and associated hardware are undertaken within the scope of established procedures.

ELEMENT	PERFORMANCE CRITERIA
	2.8 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.9 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the maintenance of transmission towers and associated hardware	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, towers and associated hardware are returned to service in accordance with requirements.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining transmission towers and associated hardware.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP27A Routine maintenance on transmission structures

Evidence shall show an understanding of procedures for routine maintenance on transmission structures and hardware to an extent indicated by the following aspects:

T1 Procedures for gaining access permits

T2 Reasons for gaining access

T3 Types of maintenance procedures on transmission structures encompassing:

- Procedure to follow for inspection/patrols according to the Transmission Supply Authority

T4 Erecting and removing of transmission equipment and hardware from a tower encompassing:

- Climbing procedures
- Square rigging principles
- Calculation of forces at work within a given square rigging system
- Construction of a square rigging system
- Procedures for changing insulators
- Note: Examples include vertical angle suspension, strain insulator, post insulator (horizontal or vertical) and bridge insulator, calculation of conductor forces

T5 Installation of temporary work platforms encompassing:

- Types and function of installation tools and equipment
- Precautions and work methods to follow
- Procedures for installations of temporary work platforms

T6 Installation of conductor protective hardware encompassing:

- Types and selection of common dampers, tools and equipment
- Control of Aeolian vibration
- Procedures for the installation of dampers onto conductors

T7 Dead line insulator washing encompassing:

- Supply Authority regulations
- Procedure for washing de-energised transmission lines

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Any one of the following:	Pyramid Delta pi Enterprise specific type
B	At least two of the following	Insulators Clamps Bolts Structural components
C	At least one of the following:	Welding Cleaning
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual pre-tension stringing of transmission overhead conductors and cables.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments

**Method of
assessment****9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units****9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the erection of non-energised, pyramid, delta, Pi or enterprise specific towers in accordance with construction plans and specifications

Tower types may include pyramid, delta and pi and other enterprise specific types.

Maintenance may include the removal, repair and replacement of tower components, including welding where appropriate; and the replacement, repair and cleaning of associated hardware.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Transmission Units

UETTD RTP28A Set-up and install transmission structure stubs

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the utilisation of geographical maps and site surveys to set out, excavate, prepare, align and install the foundation footings of a transmission tower and establish the tower stubs to ground level for the erection of a transmission towers. Survey processes and operation of survey equipment is associated with this unit.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

License to practice**3)**

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL16A	Working safely near live electrical apparatus

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare for the setting of a transmission tower stub	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
		1.3	OHS policies and procedures related to requirements and established procedures for construction activities are obtained and confirmed for the purposes of the work to be performed and communicated.
		1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
		1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept

ELEMENT**PERFORMANCE CRITERIA**

- clear according to established procedures.
- 1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.7 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
- 1.8 Relevant personnel at work site are confirmed current in First Aid, Rescue and other related work procedures according to requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Traffic management plan is identified and implemented where appropriate.
- 2 Carry out the setting of a transmission tower stub
- 2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
- 2.2 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.3 Lifting, climbing, working in excavations, and use of power tools/equipment, techniques and practices are safely followed and, currency

ELEMENT	PERFORMANCE CRITERIA
	according to requirements confirmed.
	2.4 Essential knowledge and associated skills are applied in the survey and establishment of tower stubs to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.5 Unplanned events in the establishment of tower stubs are undertaken within the scope of established procedures.
	2.6 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.7 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the setting of a transmission tower stub	<p>3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.</p> <p>3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.</p> <p>3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.</p> <p>3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures.</p> <p>3.5 Relevant work permit(s) are signed off where appropriate and returned in accordance with requirements.</p> <p>3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of setting and transmission tower stub.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP28A Overhead transmission structure stubs

Evidence shall show an understanding of the setting-up and installation of transmission structure stubs to an extent indicated by the following aspects:

T1 Mathematics techniques encompassing:

- Calculations involving fractions, decimals, ratios, proportions
- Calculations involving area, volume, mass and density
- Calculations involving transposition and substitution of formulae
- Calculations involving simple trigonometric problems.

T2 Engineering mechanics encompassing:

- Identification of basic concepts, principles and applications - Application of velocity, acceleration, force, density, torque, and pressure
- Applications of the SI units
- The relationship between work, power and energy
- Behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- Fundamentals of the basic laws of fluid mechanics.

T3 Materials properties encompassing:

- Identification and classification of engineering materials material properties
- Types and applications - properties of tensile strength, effects of temperature on the expansion of metals, ductibility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers.

T4 Operation of elevating work platform (EWP) encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with EWP including relevant certification and licensing - safe working clearances, safe operation procedures and the mandatory wearing of harness/attachment requirements, safety observers, inspection and testing procedures prior to use, set-up, operate and shut down procedures for an EWP.
- Emergency procedures for an EWP - escape procedures for an EWP, rescuing procedures, mechanical failure procedures.
- Types of EWPs insulated/uninsulated.

REQUIRED SKILLS AND KNOWLEDGE

T5 Operation and maintenance of mobile plant, tools and equipment encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with portable hydraulic equipment and portable pneumatic equipment, including relevant certification and licensing - safe working clearances, safe operation procedures, safety observers.
- Inspection and testing procedures prior to use
- Set-up, operate and shut down procedures
- Permit to work systems and isolation procedures

T6 Requirements for the use of enterprise vehicles such as, trucks and four wheel drives encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with safe use of enterprise vehicles including relevant certification and licensing such as motor cars, light and heavy commercial trucks, heavy truck/trailer combination, four wheel drive vehicles.
- Compliance with regulations associated with the securing of loads prior for transportation.

T7 Requirements for the use of chain saws including relevant certification and licensing encompassing:

- Safety precautions, requirements and responsibilities
- Selection and use of appropriate personal protective equipment
- Chain saw operation - parts and function of components and ancillary equipment, pre-operational checks, starting procedures, safe use of chain saw under load.
- Safe transporting and storage procedures

T8 Procedure in providing store support encompassing:

- Classification and identification of equipment, components and tools
- Procedures for purchasing/ordering items, removing/dispatching items, stocktaking, security, bookkeeping/record keeping
- Material handling - warehouse/depot storage techniques, handling equipment, pallet lift trucks, forklifts, cable drum handling equipment.
- Safety procedures - storage and care of safety equipment, handling hazardous materials, storage of hazardous substances and dangerous goods, depot safety procedures.
- Manufacturers and suppliers information including material safety data sheets (MSDS)

T9 Filtering and sampling of insulating oil encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with filtering and sampling such as - safe handling procedures, personal hygiene, storage and disposal procedures, Occupational Health and Safety hazards and precautions including use of appropriate personal

REQUIRED SKILLS AND KNOWLEDGE

protective equipment, environmental procedures, effects of contaminants.

- Properties of insulating oil - dielectric strength, moisture content, acidity, sludge.
- Locations where insulating oil is used - transformer, switchgear and oil filled cable.
- Filtering equipment – types, cleaning procedures, method of use.
- Techniques in filtering and sampling insulating oil - methods of sampling, methods of filtering, testing procedures on site, analysing oil effectiveness.
- Frequency of testing

T10 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker's body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair
- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

T11 Environmental fundamentals encompassing:

- Environmental standards, codes, environmental legislation, supply authority regulations and or enterprise requirements applicable to the control of environment associated with the worksite - relevant federal legislation, relevant state/territory legislation, relevant local government by-laws, relevant government or quasi

REQUIRED SKILLS AND KNOWLEDGE

government policies and regulations, relevant community planning and development agreements (include land care agreements)

- Employer and employee responsibilities
- Methods of obtaining information on environmental issues and updates
- Methods of identifying environmental impacts from work related activities
- Meaning of environmental terms - identification, assessment and control of risks, compliance, best practice, sustainable energy.
- Procedures in implementing management plans to ensure compliance

T12 Material handling and the environment encompassing:

- Methods of obtaining updated environmental information and data sheets on the proper use and handling of equipment and materials
- Environmental standards, codes, environmental legislation, OHS legislation, hazardous substances/dangerous goods regulations, supply authority regulations and or enterprise requirements applicable environmental care when handling materials including provision of manufacturers and suppliers information such as material safety data sheets (MSDS)
- Types and application of personal protective equipment used for hazards substances
- Types and application of personal protective equipment used for hazards substances and dangerous goods
- Techniques in handling equipment to eliminate/reduce risks to the environment from spillages of oils, herbicides, pesticides and chemicals from such equipment - vehicle loading crane, chainsaw, enterprise vehicles, explosive power tools
- Procedures for handling and control of spillages of herbicides
- Methods of disposing and storage of herbicides, pesticides and chemicals
- Methods of cleaning mobile plant, equipment and tools
- Recording of data

T13 Principles of surveying encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to surveying in the electricity supply industry
- Survey principles measurement of ground levels, deviation angles, compass bearings
- Basic survey of short distribution line extension.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to	Item List

	be demonstrated	
A	All of the following:	Survey techniques Set out and peg excavation markers Establish the tower stub to ground level
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual construction of lattice type tower stubs.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is

expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the construction of lattice type transmission towers.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures

RANGE STATEMENT

- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Transmission Units

UETTD RTP29A Install and maintain transmission overhead conductors and cables

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of overhead conductors and cables used on towers which includes the stringing, tensioning and terminating of the conductor/cable while de energised, securing of the conductor to the insulators or supports and the undertaking of the electrical connections. It also covers maintenance work associated with the diagnosing of faults, the conducting of visual inspections, the confirmation of phasing and the completion of other enterprise tests. It also encompasses confirming isolation of systems and circuits, and/accepting/ issuing electrical permits and the updating of system data/maintenance records.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may

License to practice

3)

require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UETTDREL11A	Apply sustainable energy and environmental procedures

Prerequisite Unit(s) 4)

UETTDREL16A Working safely near live electrical apparatus

UETTD RTP26A Install transmission structures and associated hardware

UETTD RTP27A Maintain transmission structures and associated hardware

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
<p>1 Prepare for the installation and maintenance of overhead conductors and cables used on towers</p>	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists are received/ sourced, analysed and confirmed, if necessary, by site inspection.</p>
	<p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p>
	<p>1.3 OHS policies and procedures related to requirements and established procedures for the installation and maintenance of overhead conductors and cables used on towers are obtained and confirmed for the purposes of the work to be performed and communicated.</p>
	<p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p>
	<p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p>
	<p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p>
	<p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p>
	<p>1.8 Relevant personnel at work site are confirmed current in First Aid, Rescue and other related procedures according to requirements.</p>
	<p>1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.</p>
	<p>1.10 Site is prepared according to the work schedule</p>

ELEMENT

PERFORMANCE CRITERIA

- and to minimise risk and damage to property, commerce, environment and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Traffic management plan is identified and implemented.
- 2 Carry out installation and maintenance of overhead conductors and cables used on towers
- 2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
- 2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements /permits and established procedures.
- 2.4 Essential knowledge and associated skills are applied in the safe installation and maintenance of overhead conductors and cables used on towers to ensure completion in an agreed timeframe to quality standards with a minimum of waste according to requirements.
- 2.5 Overhead conductor/cables are strung, tensioned and terminated as per requirements/established procedures.
- 2.6 Conductors and anti-vibration devices, spaces/spreaders are secured as per established procedures.
- 2.7 Electrical connections are made in accordance with the requirements/established procedures.

ELEMENT

PERFORMANCE CRITERIA

- | | |
|------|---|
| 2.8 | Maintenance, including repair and/or replacement of overhead conductors and cables used on towers is carried out, in accordance with the work schedule and requirements/established procedures. |
| 2.9 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| 2.10 | Unplanned events in the installation and maintenance of overhead conductors and cables used on towers are undertaken within the scope of established procedures. |
| 2.11 | Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills. |
| 2.12 | Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures. |
| 3 | Complete the installation and maintenance of overhead conductors and cables used on towers |
| 3.1 | Work undertaken is checked against works schedule for confirmation of phasing and conformance with requirements and, anomalies reported in accordance with established procedures. |
| 3.2 | Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable. |
| 3.3 | Work site is rehabilitated, cleaned up and made safe in accordance with established procedures. |
| 3.4 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures. |
| 3.5 | Relevant work permit(s) are signed off and, overhead conductors and cables used on towers are returned to service in accordance with requirements. |

ELEMENT

PERFORMANCE CRITERIA

- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining overhead conductors and cables (towers).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS02-TTP29A Powerline transmission installation safety

Evidence shall show an understanding of the safe working practices and procedures for the installation of overhead transmission conductors to an extent indicated by the following aspects:

T1 Limits of approach for personnel, vehicles, mobile plant and elevating work platforms (EWP)

T2 Requirements of persons prior to making bare hand contact with dead low voltage mains and apparatus

T3 Requirements of relevant electrical access permits necessary to allow work to be performed on low and high voltage apparatus

T4 Safe working practices encompassing:

- Requirements to enable safe working on conductive poles
- Procedure to attach an on-site earthing device to de-energised low and high voltage overhead circuit
- Safe working practices when working with associated hardware/equipment and insulators
- Precautions of voltages on transmission structures
- Dangers when working at heights
- Identification of hazards, assessing and controlling risks
- Types, selection, maintenance and uses of personnel protective equipment
- Permit to work systems and isolation procedures
- Safe working practices when using specialised equipment
- Emergency response and rescue including First Aid etc

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least one of the following:	Copper Aluminium Steel Composite Aluminium/steel reinforced Pilot
B	At least two of the following:	Elevated work platform Portable platform Gondola Hook ladder* Elevated work box (*must do)
C	At least five of the following:	Winches* Tension equipment* Stringing equipment Cable trailers Crimping equipment * Pre-formed splices Hardware Cable drum stands Ropes Rollers/ sheaves Comealongs Swivels (*must do)
D	At least two of the following:	Voltage/ de-energised indicating device Field intensity meter Operating rods (*must do)

E	At least one of the following:	Dynamometer Site board Abney level Sag chart* Theodolite (*must do)
F	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of overhead conductors and cables on towers.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of overhead conductor and or cables used on transmission towers

Installation and maintenance may include the stringing, tensioning, terminating, removal, repairing and replacement of the conductors/cables. Visual inspections and the diagnosing of faults is also included.

Structures include towers and columns.

Types of conductor include copper, aluminium, steel and composites. Conductor configurations may be single or bundled and include pilot cables.

Overhead conductors include earthing systems

Plant may include elevating work platform, winches and capstans, specialist tension stringing equipment, cable trailers, cable drum stands and equipotential equipment.

Testing and recording equipment includes, insulation resistance testers, recording meters and other approved devices and techniques applicable to the voltage. .

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards

RANGE STATEMENT

- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements.
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Transmission Units

UETTD RTP30A Inspect transmission overhead structures and electrical apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the inspection as per requirements of overhead structures such as towers and electrical apparatus. Overhead structures include towers and overhead conductors and or cables include, underground and overhead transition points, electrical equipment, hardware and or earthing systems. It also includes the completion of inspection reports and other relevant documentation in accordance with requirements.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|--|---|
| <p>1 Prepare for the inspection of overhead structures and electrical apparatus used on towers</p> | <p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the inspection of overhead structures and electrical apparatus used on towers are obtained and understood for the purposes of the work to be performed.</p> <p>1.4 Work is prioritised and sequenced following</p> |
|--|---|

ELEMENT

PERFORMANCE CRITERIA

- consultation with others for completion within acceptable timeframes and in accordance with established procedures.
- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
- 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and obtained and, in working order.
- 1.8 Relevant personnel at work site are confirmed current in First Aid, Tower/Pole Top Rescue and other related work procedures according to requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Traffic management plan is identified and implemented.

ELEMENT	PERFORMANCE CRITERIA
<p>2 Carry out inspection of overhead structures and electrical apparatus used on towers</p>	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.</p>
	<p>2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.</p>
	<p>2.3 Essential knowledge and associated skills are applied in the safe inspection of overhead structures and electrical apparatus used on towers to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p>
	<p>2.4 Inspection of overhead structures and electrical apparatus used on towers is carried out, in accordance with the work schedule and requirements/established procedures.</p>
	<p>2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p>
	<p>2.6 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.</p>
	<p>2.7 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.</p>
<p>3 Complete the inspection of overhead structures and electrical apparatus used on towers</p>	<p>3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.</p>
	<p>3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures.</p>
	<p>3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.</p>

ELEMENT

PERFORMANCE CRITERIA

- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, overhead structures and electrical apparatus used on towers are returned to service in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of inspecting overhead structures and electrical apparatus (towers).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP30A Inspection of transmission assets

Evidence shall show an understanding of the inspection of transmission assets to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements

T2 Characteristics of materials used for transmission structures within the electrical transmission system encompassing:

- Faults that occur that influence the integrity of the structure

T3 Deterioration of assets encompassing:

- Relationship between steel, concrete and other materials
- Deterioration in steel and concrete
- Inspection procedures for deterioration

T4 Clearances and safety procedures

T5 Ground line inspection procedures of electrical transmission lines encompassing:

- Requirements for inspection of transmission lines and insulators
- Use of specific equipment during inspection
- Techniques in transmission line inspection

T6 Overhead line inspection procedures of electrical transmission lines encompassing:

- Methods and requirements for overhead line inspection on electrical structures
- Clearances for overhead conductors, cables and structures
- Techniques used to obtain close inspection of transmission lines
- Use of specific equipment and testing inspection
- Methods of recording data

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least four of the following:	Towers Overhead conductors/cables Structural fittings Electrical Equipment Hardware. Earthing systems
B	At least two of the following:	Visual* Infra-red camera X-Ray Camera Binoculars/telescope (* must do)
C	All of the following:	Reporting procedures Reporting outcomes
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual inspection of overhead structures and

electrical apparatus on towers.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the inspection of overhead structures such as towers and electrical apparatus and equipment.

Inspection may be carried out on foot, and/or by conventional ground-based vehicle, or from the air. Aircraft may be helicopters or fixed-wing types.

Inspection techniques include use of X-ray and infrared camera.

Items to be inspected may include towers but not overhead poles and or structures.

Types of electrical apparatus to be inspected include overhead conductors, cables, hardware and footings, underground cables and overhead transition points and, electrical equipment such as pole-mounted transformers and air-break switches, hardware and or earthing systems.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS

RANGE STATEMENT

- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Transmission Units

UETTD RTP31A Maintain energised transmission lines using high voltage live work stick method

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of energised high voltage transmission overhead electrical apparatus, i.e. live line work using line Stick techniques and includes the verification of the site conditions and the potential hazards, the conformation and calculation of physical loads and the selection of appropriate and authorised work method. It includes the preparation and cleaning of specialist material and tools in accordance with authorised technical instructions. It also encompasses the undertaking of OHS and safe working practices and the rendering inoperative of the automatic re-closing device including its restoration in accordance with the work plan and the procedure of issuing/accepting electrical access permits and or relevant work document.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Pathway 1

Certificate III Transmission overhead powerline worker or a qualified transmission powerline worker.

Pathway 2

Unit Code	Unit Title
BSBWOR402A	Promote team effectiveness
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components

Prerequisite Unit(s)	4)
	UEENEEE104A Solve problems in d.c. Circuits
	UEENEEE105A Fix and secure electrotechnology equipment
	UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A Solve problems in electromagnetic devices and related circuits
	UEENEEG102A Solve problems in low voltage a.c. Circuits
	UETTDREL11A Apply sustainable energy and environmental procedures
	UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A Working safely near live electrical apparatus
	UETTD RIS54A Install and maintain poles, structures, overhead conductors and cables
	UETTD RIS65A Contribute to coordinated HV live working
	UETTD RTP26A Install transmission structures and associated hardware
	UETTD RTP27A Maintain transmission structures and associated hardware
	UETTD RTP29A Install and maintain transmission overhead conductors and cables
	UETTD RTP30A Inspect transmission overhead structures and electrical apparatus
	UETTD RTP99A Test and verify transmission overhead installations

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
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Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|---|--|
| 1 Prepare/plan to maintain energised transmission lines using high voltage live work stick method | 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination. |
| | 1.2 Relevant requirements and established |

ELEMENT

PERFORMANCE CRITERIA

- procedures for the work are communicated to all personnel and identified for all work sites.
- 1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
 - 1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
 - 1.5 Risk control measures are identified, prioritised and evaluated against the work schedule.
 - 1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
 - 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
 - 1.8 Relevant personnel at work site are confirmed current in First Aid, CPR, and other rescue procedures according to requirements.
 - 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
 - 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
 - 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA
	1.12 Positioning of road signs, barriers and warning devices is planned in accordance with requirements.
2 Carry out the maintenance of energised transmission lines using high voltage live work stick method	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
	2.2 First Aid, CPR and other Rescue procedures and other related work procedures are performed according to requirements and/or established procedures.
	2.3 Lifting, climbing, working aloft, and tools/equipment, techniques and practices are safely exercised according to requirements.
	2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.5 Auto reclose devices associated with the circuits being worked on have been rendered inoperative and necessary work documentation acquired in accordance with enterprise requirements.
	2.6 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
	2.7 Maintenance of energised high voltage overhead electrical transmission apparatus is carried out, in accordance with the work schedule and requirements and/or established procedures.
	2.8 Essential knowledge and associated skills are applied in the safe maintenance of energised high voltage overhead electrical transmission apparatus to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
	2.9 Solutions to non-routine problems are identified

ELEMENT

PERFORMANCE CRITERIA

- and actioned using acquired essential knowledge and associated skills according to requirements.
- 2.10 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
- 3 Complete the maintenance of energised transmission lines using high voltage live work stick method
- 3.1 Work is checked against schedule for conformance, anomalies reported in accordance with established procedures.
- 3.2 Accidents and /or injuries are reported and followed up in accordance with requirements/established procedures.
- 3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work permit(s) (live line) are signed off and client/customer advised in accordance with requirements.
- 3.6 Works completion records, reports, as installed/modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining energised lines (transmission) using live line stick technique.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP31A Transmission live stick work for voltages from 66 kV up to 500 kV on structures and poles

Evidence shall show an understanding of working on energised lines for voltages from 66 kV up to 500 kV utilising live work stick method on structures and poles to an extent indicated by the following aspects:

T1 Commonwealth/State/Territory legislation, Standards, codes, supply authority regulations and or enterprise requirements associated with working on energised lines for voltages from 66 kV up to 500 kV utilising live work stick method.

T2 Relationship and responsibilities of each team member encompassing:

- Roles of the individual in the team
- Contribution to joint outcomes
- Goals/plans and objectives of the team
- Team communication
- Effective teamwork

T3 Safety precautions for working on energised lines encompassing:

- Live work minimum approach distances for persons and plant
- Calculation of forces supported by live working equipment
- Identification of OHS hazards, assessing and controlling risks
- Types, selection, maintenance, storage and uses of personnel protective equipment required for live stick work
- Types and functions, safe working policies, procedures and practices for use of specialised live work plant, equipment and tools
- Emergency response and rescue

T4 Electrical and electrostatic principles encompassing:

- Relationship of the resistance of a human body to different levels of current and voltage
- Relationship of a human body to an electric field
- Effects of electrostatic induction for live stick work
- Relationship of phase voltage and respective line voltages
- Effect of distance
- Potential of an object within the field and the effect of distances to the potential

REQUIRED SKILLS AND KNOWLEDGE

T5 HV feeder auto-reclosing suppression encompassing:

- Function
- Application
- Live work access authority/permit systems

T6 Selection care, use and maintenance of sticks for live work encompassing:

- Care of live work sticks
- Use and load limitations of live work sticks
- Cleaning live work sticks
- Restoring gloss surfaces of live work sticks
- Repairing small ruptures of live work sticks
- Repairing broken fittings of live work sticks

T7 Selection, care, use and maintenance of ropes for live work encompassing:

- Identification of ropes used for live stick work
- Characteristics
- Types
- Application
- Restrictions
- Storage
- Transport
- Cleaning
- Labeling
- Testing
- Records
- Techniques in splicing
- Determining suitability of the rope for continued use

T8 Live stick work techniques performed in accordance with enterprise requirements encompassing:

- Connecting and/or disconnecting HV bypass bridges
- Erect and use boom pole and insulator cradle
- Erection and/or replacement of structures and poles
- Installing and/or replacing HV cross-arms
- Installing and/or replacing HV suspension insulators
- Installing and/or replacing HV strain insulators
- Installing and/or replacing suspension clamp unit
- Installing and/or replacing fittings and hardware to conductors
- Installing and/or replacing vibration dampers
- Installing and/or replacing preformed repair rods

T9 Checking electrical integrity of insulators prior to work

REQUIRED SKILLS AND KNOWLEDGE

- Visual and audible assessment
- Test for disc voltage difference
- Plot data
- Assess data
- Determine condition of a insulator string

T10 Rigging procedures for live work encompassing

- Identification of rigging points on structures
- Selection and positioning of rigging equipment on structures
- Selection of and operation of rope tackles

T11 Safety observer principles and responsibilities encompassing:

- Areas of responsibility
- Supervisor skills
- Protocols and procedures
- Specific duties of a safety observer
- Techniques in observing others in the safe performance of their work
- Minimum approach distances for personnel and hand held tools
- Special Limits of Approach.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the

normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be ‘rich’ in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control

measures as specified in the Performance Criteria and range; and

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least two of the following:	Ladder access EWP access EWB access Structure access
B	All of the following:	Electrical integrity of insulators Replace strain insulators Replace suspension insulators
C	At least three of the following:	Replace/install vibration dampers Repair/replace conductor spacers Repair/replace conductor fittings and

		hardware Apply pre-formed helical fittings Install/remove vibration meter Replace crossarm Replace pole/s
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual live line stick technique application on energised transmission lines.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of energised lines (transmission) using live line stick technique and includes the replacement of suspension and tension insulators, the calculating of conductor loads being both vertical and tension and conductor repairs.

Maintenance includes:

Live line Stick care and maintenance including mandatory testing.

Rope care and maintenance including mandatory testing.

Electrical testing of insulators.

Repair conductors.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS

RANGE STATEMENT

- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Transmission Units

UETTD RTP32A Maintain energised transmission lines using high voltage live work Barehand method

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of energised high voltage transmission overhead electrical apparatus, i.e. live work using Barehand method and includes the verification of the site conditions and the potential hazards, the conformation and calculation of physical loads and the selection of appropriate and authorised work method. It includes the preparation and cleaning of specialist material and tools in accordance with authorised technical instructions. It also encompasses the undertaking of OHS and safe working practices and the rendering inoperative of the automatic re-closing device including its restoration in accordance with the work plan and the procedure of issuing/accepting electrical access permits and or relevant work document.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Pathway 1

Qualified and authorised Transmission Lineworker

Pathway 2

Unit Code	Unit Title
BSBWOR402A	Promote team effectiveness
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits

Prerequisite Unit(s)	4)
	UEENEEE105A Fix and secure electrotechnology equipment
	UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A Solve problems in electromagnetic devices and related circuits
	UEENEEG102A Solve problems in low voltage a.c. Circuits
	UETTDREL11A Apply sustainable energy and environmental procedures
	UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A Working safely near live electrical apparatus
	UETTD RIS54A Install and maintain poles, structures, overhead conductors and cables
	UETTD RIS65A Contribute to coordinated HV live working
	UETTD RTP26A Install transmission structures and associated hardware
	UETTD RTP27A Maintain transmission structures and associated hardware
	UETTD RTP29A Install and maintain transmission overhead conductors and cables
	UETTD RTP30A Inspect transmission overhead structures and electrical apparatus
	UETTD RTP31A Maintain energised transmission lines using high voltage live work stick method
	UETTD RTP99A Test and verify transmission overhead installations

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|--|--|
| 1 Prepare/plan to maintain energised transmission lines using high voltage live work barehand method | 1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination. |
| | 1.2 Relevant requirements and established |

ELEMENT

PERFORMANCE CRITERIA

- procedures for the work are communicated to all personnel and identified for all work sites.
- 1.3 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
- 1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
- 1.5 Risk control measures are identified, prioritised and evaluated against the work schedule.
- 1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
- 1.8 Relevant personnel at work site are confirmed current in First Aid, CPR, and other rescue procedures according to requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with

ELEMENT

PERFORMANCE CRITERIA

- established procedures.
- 1.12 Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements.
- 2 Carry out the maintenance of transmission lines using high voltage live work barehand method
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.
- 2.2 First Aid, CPR and other Rescue procedures and other related work procedures are performed according to requirements and/or established procedures.
- 2.3 Lifting, climbing, working aloft, and tools/equipment, techniques and practices are safely exercised according to requirements.
- 2.4 Auto reclose devices associated with the circuits being worked on have been rendered inoperative and necessary work documentation acquired in accordance with enterprise requirements.
- 2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.6 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
- 2.7 Maintenance of energised high voltage overhead electrical transmission apparatus is carried out, in accordance with the work schedule and requirements and/or established procedures.
- 2.8 Essential knowledge and associated skills are applied in the safe maintenance of energised high voltage overhead electrical transmission apparatus to ensure completion in an agreed timeframe and, to quality standards with a

ELEMENT

PERFORMANCE CRITERIA

- minimum of waste according to requirements.
- 2.9 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
- 2.10 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.
- 3 Complete the maintenance of transmission lines using high voltage live work barehand method
- 3.1 Work is checked against schedule for conformance, anomalies reported in accordance with established procedures.
- 3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.
- 3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Relevant work permit(s) (live line) are signed off and client/customer advised in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining energised lines (transmission) using Bare Hand technique.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP32A Transmission live barehand work for voltages up to and including 500 kV

Evidence shall show an understanding of working on energised lines for voltages up to and including 500 kV utilising the live barehand work method to an extent indicated by the following aspects:

T1 Commonwealth/State/Territory legislation, Standards, codes, supply authority regulations and or enterprise requirements associated with working on energised lines for voltages up to and including 500 kV utilising the live barehand work method.

T2 Relationship and responsibilities of each team member encompassing:

- Role of the individual in the team
- Contribution to joint outcomes
- Goals/plans and objectives of the team
- Work team communication
- Effective teamwork

T3 Safety precautions for working on energised lines encompassing:

- Live work minimum approach distances for persons and plant
- Calculation of forces supported by live working equipment
- Identification of OHS hazards, assessing and controlling the risks
- Types, selection, maintenance, storage and uses of personnel protective equipment including the faraday suit
- Types and functions, safe working policies, procedures and practices for use of specialised live work plant, equipment and tools
- Emergency response and rescue.

T4 Electrical and electrostatic principles encompassing:

- Relationship of the resistance of a human body to different levels of current and voltage
- Relationship of a human body in an electric field
- Effects of electrostatic induction for live barehand work
- Relationship of phase voltage and respective line voltages
- Effect of distance to voltage
- Potential of a conductive object within a field

REQUIRED SKILLS AND KNOWLEDGE

T5 HV feeder auto-reclosing suppression encompassing:

- Function
- Application
- Live work access authority/permit systems

T6 Live barehand work techniques performed in accordance with enterprise requirements encompassing:

- Fit and test a faraday suit
- Erect and use an insulated ladder
- Erect and use a boom pole and insulator cradle
- Installing and/or replacing HV suspension insulators
- Installing and/or replacing HV strain insulators
- Installing and/or replacing suspension clamp unit
- Installing and/or replacing fittings and hardware to conductors
- Installing and/or replacing vibration dampers
- Installing and/or replacing conductor spacers
- Installing and/or replacing preformed repair rods
- Installing and/or replacing HV cross-arms
- Connecting and/or disconnecting HV bypass bridges.

T7 Selection, care, use and maintenance of ropes for live work encompassing:

- Identification of ropes used for live barehand work
- Characteristics
- Application
- Restrictions
- Precautions
- Storage
- Transport
- Cleaning and caring
- Labelling
- Testing
- Records
- Techniques in splicing
- Determining suitability of the rope for continued use

T8 Selection care, use and maintenance of sticks for live work encompassing:

- Care of live work sticks
- Use and load limitations of live work sticks
- Cleaning live work sticks
- Restoring gloss surfaces of live work sticks
- Repairing small ruptures of live work sticks

REQUIRED SKILLS AND KNOWLEDGE

- Repairing broken fittings of live work sticks

T9 Checking integrity of insulators prior to work encompassing:

- Visual and audible assessment
- Check disc voltage difference
- Plot data
- Assess data
- Determine condition of insulator string

T10 Rigging procedures for live barehand work encompassing

- Identification of rigging points on structures
- Selection and positioning of rigging equipment on structures
- Selection of and operation of rope tackles

T11 Safety observer principles and responsibilities encompassing:

- Areas of responsibility
- Supervisor skills
- Protocols and procedures
- Specific duties of a safety observer
- Techniques in observing others in the safe performance of their work
- Minimum approach distances for personnel and hand held tools
- Special Limits of Approach.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this

shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least one of the following:	Ladder access EWP access EWB access Rope access
B	All of the following:	Replace strain insulators Replace suspension insulators
C	At least three of the following:	Replace/connect bridge/bonding connections Replace vibration damper

		Repair/replace conductor spacers Repair/replace conductor joint Repair conductor
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual usage of Bare Hand technique in the maintenance of energised transmission lines.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction

Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of energised lines (transmission) using Bare Hand techniques and includes the replacement of suspension and tension insulators and the calculating of conductor loads being both vertical and tension and conductor repairs. In addition the work shall include rope care and maintenance including mandatory testing; electrical testing of insulators; conductive clothing application and maintenance.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Transmission Units

UETTD RTP33A Maintain energised transmission lines using Barehand technique on a helicopter platform

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of energised high voltage transmission overhead electrical apparatus, i.e. live line work using Bare Hand techniques from a helicopter platform and includes the verification of the site conditions and the potential hazards, the conformation and calculation of physical loads and the selection of appropriate and authorised work method. It includes the preparation and cleaning of specialist material and tools in accordance with authorised technical instructions. It also encompasses the undertaking of OHS and safe working practices and the rendering inoperative of the automatic re-closing device including its restoration in accordance with the work plan and the procedure of issuing/accepting electrical access permits and or relevant work document.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Pathway 1

Qualified and authorised Transmission Lineworker

Pathway 2

Unit Code	Unit Title
BSBWOR402A	Promote team effectiveness
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits

Prerequisite Unit(s)	4)
	UEENEEE105A Fix and secure electrotechnology equipment
	UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications
	UEENEEG101A Solve problems in electromagnetic devices and related circuits
	UEENEEG102A Solve problems in low voltage a.c. Circuits
	UETTDREL11A Apply sustainable energy and environmental procedures
	UETTDREL12A Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A Working safely near live electrical apparatus
	UETTD RIS54A Install and maintain poles, structures, overhead conductors and cables
	UETTD RIS65A Contribute to coordinated HV live working
	UETTD RTP26A Install transmission structures and associated hardware
	UETTD RTP27A Maintain transmission structures and associated hardware
	UETTD RTP29A Install and maintain transmission overhead conductors and cables
	UETTD RTP30A Inspect transmission overhead structures and electrical apparatus
	UETTD RTP31A Maintain energised transmission lines using high voltage live work stick method
	UETTD RTP32A Maintain energised transmission lines using high voltage live work Barehand method

Prerequisite Unit(s) 4)

UETTD RTP99A Test and verify transmission overhead installations

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to maintain energised lines (transmission) using Bare Hand technique from a helicopter platform	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.
	1.3 Risk control measures are identified, prioritised and evaluated against the work method.
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
	1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
	1.8 Relevant personnel at work site are confirmed current in First Aid, CPR, and other rescue procedures according to requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|--|--|
| | 1.10 | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures. |
| | 1.11 | Personnel participating in the work, including plant operators and contractors, are fully briefed and instructed in respective responsibilities coordinated and authorised where applicable in accordance with established procedures. |
| | 1.12 | Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements. |
| 2 | Carry out the maintenance of energised lines (transmission) using Bare Hand technique from a helicopter platform | |
| | 2.1 | OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures. |
| | 2.2 | First Aid, CPR and other Rescue procedures and other related work procedures are performed according to requirements and/or established procedures. |
| | 2.3 | Lifting and tools/equipment, techniques and practices are safely exercised according to requirements. |
| | 2.4 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| | 2.5 | Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures. |
| | 2.6 | Maintenance of energised high voltage overhead electrical transmission apparatus is carried out, in accordance with the work schedule and requirements and/or established procedures. |

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|---|---|
| | 2.7 | Essential knowledge and associated skills are applied in the safe maintenance of energised high voltage overhead electrical transmission apparatus to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements. |
| | 2.8 | Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements. |
| | 2.9 | Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard. |
| 3 | Complete the maintenance of energised lines (transmission) using Bare Hand technique from a helicopter platform | |
| | 3.1 | Work is checked against schedule for conformance, anomalies reported in accordance with established procedures. |
| | 3.2 | Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures. |
| | 3.3 | Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures |
| | 3.4 | Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures. |
| | 3.5 | Relevant work permit(s) (live line) are signed off and client/customer advised in accordance with requirements. |
| | 3.6 | Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining energised lines (transmission) using Bare Hand technique on a helicopter platform.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP33A Energised transmission lines using Barehand Technique on a helicopter platform

Evidence shall show an understanding of working on energised lines for voltages up to and including 500 kV utilising the live barehand work method on a helicopter platform to an extent indicated by the following aspects:

T1 Working on energised lines at or above 132 kV using live line bare-hand techniques from a helicopter platform encompassing:

- Commonwealth/State/Territory legislation, Standards, codes, Commonwealth/State/Territory legislation, supply and aviation authority regulations and or enterprise requirements associated with extra high voltage (EHV) live line bare-hands work from a helicopter platform
- Safety precautions when working on helicopters - live line minimum approach distances including safe approach for selected helicopter type(s), Occupational Health and Safety hazards and precautions, determination of helicopter platform for task and working environment (i.e. network and relevant aircraft authority), identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment, live line access authority/permit systems, disabling auto-reclosing function, ensuring functioning of fault current protective devices, checking integrity of insulation prior to work commencement, types and function of specialised live working equipment and tools, safe working policies, procedures and practices when using/operating specialised equipment and tools, methods of using specialised equipment and tools, work team communication, use of safety observers, pilot briefing requirements, emergency response and rescue including First Aid etc, techniques for working bare-hands on live line extra high voltage from a helicopter platform, aircraft operations induction including flight plan clearances, systems, equipment and communication requirements, types and functions of aerial attachment equipment including appropriate testing, rating and certification.
- Aircrew familiarisation with live-line systems operations and equipment requirements.

T2 Principles of high voltage encompassing:

- Commonwealth/State/Territory legislation, Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with working on or near High Voltage

REQUIRED SKILLS AND KNOWLEDGE

- Electrical and electrostatic principles related to high voltage lines - relationship of current, voltage and resistance as related to transmission lines, relationship of phase voltage and respective line voltages
- Production of an electric field – units, effect of distance, potential of an object within the field and the effect of distances to the potential
- HV insulators - construction of a disc insulator, construction of a polymeric insulator, effects of an electrical field on disc insulators, identification of the number of disc insulators needed for a single line voltage, performance of a failed disc insulator on the line and the system, determining the minimum allowable number of discs per string for each line voltage in the system before bare-hand work is to proceed, techniques in detecting a failed disc in a string, techniques in using appropriate tools and equipment to test a string, methods of recording data
- Effects of electrostatic induction on the human body - relationship of the resistance of a human body to different levels of current and voltage, relationship of a human body to an electric field, effects of electrostatic induction on bare-hand work
- Application of Faraday's cage - effects of a body, advantages, description of the Faraday's cage used by bare-hand live-line workers
- Safety precautions working on or near High Voltage electrical apparatus - safe approach distances from live line, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment, permit to work systems and isolation procedures, types and function of specialised live working equipment, safe working policies, procedures and practices when using and operating specialised equipment, methods of using specialised equipment, emergency response and rescue including First Aid etc
- Effects of lighting and switching surges on performance off string insulators - health effects to workers, methods used to alleviate surges on transmission lines
- Magnetic field - difference between magnetic fields and electrostatic fields, source of magnetic field, techniques in locating, measuring and analysing known sources of magnetic fields, reasons for monitoring magnetic field exposure, techniques used to monitor magnetic fields.

T3 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker's body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole

REQUIRED SKILLS AND KNOWLEDGE

chair

- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full

can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	All of the following:	Usage of a helicopter Usage of a platform
B	At least one of the following:	Replace/connect bridge/bonding connections Replace vibration damper Repair/replace conductor spacers Repair/replace conductor joint Repair conductor Application of helical splice
C	At least one occasion	Dealing with an unplanned event by drawing on essential

		knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual usage of the Bare Hand technique from a helicopter platform.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of conductors and hardware, the calculating of conductor load in tension. In addition the work shall include conductive clothing application and maintenance; working from a helicopter platform; working safely from a helicopter platform; safe working practises in and around aircraft.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Transmission Units

UETTD RTP34A Install/maintain overhead transmission network infrastructure

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the erection of non-energised, pyramid, delta, Pi or enterprise specific transmission towers and associated hardware and includes installation and maintenance of poles and/or structures and associated hardware and the installation and maintenance of overhead conductors and cables used on towers. It encompasses the erection of components in accordance with construction plans, specifications, work orders and standing enterprise requirements. Erection could also involve cleaning and welding. It also encompasses maintenance work associated with the diagnosing of faults, the conducting of visual inspections, the confirmation of phasing and the completion of other enterprise tests on overhead conductors and cables. It also encompasses confirming isolation of systems and circuits, and/accepting/ issuing electrical permits. The updating of system data, records and or completion of relevant documentation in accordance with enterprise requirements also forms part of this competency.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment

Prerequisite Unit(s)	4)
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UEENEEG103A	Install low voltage wiring and accessories
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits

Prerequisite Unit(s) 4)

UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
UETTDREL16A	Working safely near live electrical apparatus
UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
UETTD RIS67A	Solve problems in energy supply network equipment

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan for the installation and maintenance of transmission network infrastructure	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the installation and maintenance of transmission network infrastructure are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p>

ELEMENT	PERFORMANCE CRITERIA
	1.8 Relevant personnel at work site are confirmed current in First Aid, Tower/Pole Top Rescue and other related work procedures according to requirements.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
	1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
	1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
	1.12 Traffic management plan is identified and implemented.
2 Carry out the installation and maintenance of transmission network infrastructure	2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
	2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
	2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements /permits and established procedures.
	2.4 Essential knowledge and associated skills are applied in the safe installation and maintenance of transmission network infrastructure to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.

ELEMENT**PERFORMANCE CRITERIA**

- 2.5 Poles and/or structures and their associated hardware to be installed are stabilised according to requirements.
- 2.6 Installation of poles and/or structures is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.7 Towers and associated hardware to be erected are stabilised according to requirements.
- 2.8 Maintenance, including repair and/or replacement of poles and/or structures is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.9 Overhead conductor/cables are strung, tensioned and terminated as per requirements/established procedures.
- 2.10 Conductors and anti-vibration devices, spaces/spreaders are secured as per established procedures.
- 2.11 Electrical connections are made in accordance with the requirements/established procedures.
- 2.12 Maintenance, including repair and/or replacement of overhead conductors and cables used on towers is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.13 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.14 Erection of towers and associated hardware is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.15 Unplanned events in the erection of towers and associated hardware are undertaken within the scope of established procedures.

ELEMENT	PERFORMANCE CRITERIA
	2.16 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
	2.17 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete the installation and maintenance of transmission network infrastructure	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, the transmission network infrastructure is returned to service in accordance with requirements.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of erecting transmission towers and associated hardware.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP34A Overhead transmission network infrastructure

Evidence shall show an understanding of the installation and maintenance of overhead transmission network infrastructure to an extent indicated by the following aspects:

T1 Mathematics techniques encompassing:

- Calculations involving fractions, decimals, ratios, proportions
- Calculations involving area, volume, mass and density
- Calculations involving transposition and substitution of formulae
- Calculations involving simple trigonometric problems.

T2 Engineering mechanics encompassing:

- Identification of basic concepts, principles and applications - Application of velocity, acceleration, force, density, torque, and pressure
- Applications of the SI units
- The relationship between work, power and energy
- Behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- Fundamentals of the basic laws of fluid mechanics.

T3 Materials properties encompassing:

- Identification and classification of engineering materials material properties
- Types and applications - properties of tensile strength, effects of temperature on the expansion of metals, ductibility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers.

T4 Basic rigging techniques encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with rigging including the operation of cranes, hoists and winches and relevant certification and licensing (if required)
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Safe use of rigging equipment, tools and associated equipment - types, techniques and application
- Site inspection procedures - identifying hazards, assessing and controlling risks,

REQUIRED SKILLS AND KNOWLEDGE

appropriate sequence of loading and unloading

- Determining the mass and dimensions of load
- Selection and inspection procedures - rigging equipment, materials and tools (natural and synthetic fibre ropes and chains, fittings, winch and capstan), ratings of wire ropes and slings, removing, repairing and replacing of damage parts.
- Techniques for assembling and erecting power winches and capstans
- Checking the integrity of support structure; visual inspection of load connections
- Techniques in moving, lifting, shifting, managing and placing loads - use of appropriate communication and signalling methods, codes of practice/compliance, enterprise and Commonwealth, State/Territory legislative requirements, weather conditions, erection of safety nets and lines, methods of fixing and anchoring loads, load stability.

T5 Procedure in providing store support encompassing:

- Classification and identification of equipment, components and tools
- Procedures for purchasing/ordering items, removing/dispatching items, stocktaking, security, bookkeeping/record keeping
- Material handling - warehouse/depot storage techniques, handling equipment, pallet lift trucks, forklifts, cable drum handling equipment.
- Safety procedures - storage and care of safety equipment, handling hazardous materials, storage of hazardous substances and dangerous goods, depot safety procedures.
- Manufacturers and suppliers information including material safety data sheets (MSDS)

T6 Generation systems encompassing:

- Methods of generating electricity - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
- Relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
- The purpose and features of typical types of co-generation systems.

T7 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV

REQUIRED SKILLS AND KNOWLEDGE

equipment associated with substations

T8 Substations, power transformers and reactors encompassing:

- Relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
- Characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling
- Auxiliary equipment used on transformers - function and basic operation of equipment
- Maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault finding procedures
- Description, purpose and characteristics of a reactors

T9 Installation of poles and or structures and hardware encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to installing poles and associated hardware
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Characteristics and applications of different types of poles and associated hardware
- Techniques for installing poles and associated hardware - types of installation equipment/tools, excavation methods, types of footings/foundations, types of attachments, earthing systems, clearances between conductors.
- Safe methods of erecting and stabling poles and or structures and cross arms
- Techniques for maintenance of poles and associated hardware - stabilisation techniques for unstable poles
- Methods of strengthen poles, maintenance and replacement of high voltage insulators and cross arms

T10 Transmission structures and hardware encompassing:

- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- Types of structures
- Types and function of associated hardware/equipment and insulators
- Types of conductors
- Location of transmissions structures
- Other equipment used on transmission structures, e.g. aircraft warning devices

T11 Procedures for routine maintenance on transmission structures and hardware encompassing:

- Procedures for gaining access permits

REQUIRED SKILLS AND KNOWLEDGE

- Reasons for gaining access
- Types of maintenance procedures on transmission structures - procedure to follow for inspection/patrols according to the Transmission Supply Authority
- Erecting and removing of transmission equipment and hardware from a tower - climbing procedures, square rigging principles, calculation of forces at work within a given square rigging system, construction of a square rigging system.
- Procedures for changing insulators - vertical angle suspension, strain insulator, post insulator (horizontal or vertical) and bridge insulator, calculation of conductor forces
- Installation of temporary work platforms - types and function of installation tools and equipment, precautions and work methods to follow, procedures for installations of temporary work platforms.
- Installation of conductor protective hardware - types and selection of common dampers, tools and equipment, control of Aeolian vibration, procedures for the installation of dampers onto conductors.
- Dead line insulator washing - Supply Authority regulations, procedure for washing de-energised transmission lines.

T12 Procedures for installation and maintenance on transmission lines, structures and hardware encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and maintenance of transmission lines and associated equipment
- Requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - minimum construction clearances for transmission lines, sag/tension requirements.
- Construction types and structures used in transmission lines
- Types, sizes and characteristics of transmission conductors - aluminium conductors steel reinforced and earthing conductors.
- Types of electrical connections used to connect transmission conductors - compression termination and bolted termination.
- Causes and effects of poor electrical connections
- Types and application of specialised tools, equipment and hardware for the stringing of transmission conductors
- Techniques for stringing, tensioning and terminating transmission conductors
- Techniques for installation of associated hardware used on transmission towers
- Techniques for maintenance of damaged transmission conductors - repair and replacement

T13 Safe working practices and procedures for the installation of overhead transmission conductors encompassing:

- Limits of approach for personnel, vehicles, mobile plant and elevating work platforms (EWP)
- Requirements of persons prior to making bare hand contact with dead low voltage

REQUIRED SKILLS AND KNOWLEDGE

mains and apparatus

- Requirements of relevant electrical access permits necessary to allow work to be performed on low and high voltage apparatus
- Safe working practices - requirements to enable safe working on conductive poles, procedure to attach an “on-site” earthing device to de-energised low and high voltage overhead circuit, safe working practices when working with associated hardware/equipment and insulators, precautions of voltages on transmission structures, dangers when working at heights, identification of hazards, assessing and controlling risks, types, selection, maintenance and uses of personnel protective equipment, permit to work systems and isolation procedures, safe working practices when using specialised equipment.
- Emergency response and rescue including First Aid etc

T14 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker’s body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair
- Traffic management - purpose of traffic management and a line worker’s responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

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EVIDENCE GUIDE

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The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

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- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Install and maintain at least one of the following:	Wood pole/structure Steel pole/structure Concrete pole/structure Composite pole/structure
B	With regards to "A" incorporate at least three of the following:	Insulators Cross arm braces Crossarms Pole steps Shackle straps Earth leads Traction supports Traction registration Bonding
C	With regards to "A" incorporate at least one of the following:	Baulking Stays Concreting including foundation
D	With regards to "A" incorporate at least one of the following:	Crane Auger/erector 'A' frame Lifting beam Pole pikes Helicopter lift
E	Erect any one of the following towers:	Pyramid Delta pi Enterprise specific type
F	With regards to "E" incorporate at least two of the following:	Insulators Clamps Bolts Structural components

G	With regards to "E" incorporate at least one of the following:	Welding Cleaning
H	Install and maintain at least one of the following:	Copper Aluminium Steel Composite Aluminium/steel reinforced Pilot
I	With regards to "H" incorporate at least two of the following:	Elevated work platform Portable platform Gondola Hook ladder* Elevated work box (*must do)
J	With regards to "H" incorporate at least five of the following:	Winches* Tension equipment* Stringing equipment Cable trailers Crimping equipment * Pre-formed splices Hardware Cable drum stands Ropes Rollers/ sheaves Comealongs Swivels (*must do)
K	With regards to "H" incorporate at least two of the following:	Voltage/ de-energised indicating device Field intensity meter Operating rods

		(*must do)
L	With regards to "H" incorporate at least one of the following:	Dynamometer Site board Abney level Sag chart* Theodolite (*must do)
M	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual erection of towers and associated equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods

given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of transmission network infrastructure in accordance with the following:

Tower types may include pyramid, delta and pi and other enterprise specific types.

Equipment may include:

Pole types and structures may include wood, concrete, steel and composite.

Maintenance may include the basic inspection, removal, repair and replacement of poles including welding, pole staking and rebutting.

Associated hardware includes insulators, crossarms, stays, earth down leads and bond wires, crossarm braces, pole steps, shackle straps and associated bolts and clamps, cantilever assembly, pull off, head span, portal, drop tube

Pole stabilisation techniques include back-fill consolidation, concreting, baulking, reinforcement nailing, approved steel reinforcing and temporary and permanent stay-wires.

Methods of erection may include crane, auger/erector, winch/'A' frame, lifting apparatus and helicopter lift.

Installation and maintenance of overhead conductor and or cables used on transmission towers may include the stringing, tensioning, terminating, removal, repairing and replacement of the conductors/cables. Visual inspections and the diagnosing of faults is also included.

Structures include towers and columns.

Types of conductor include copper, aluminium, steel and composites. Conductor configurations may be single or bundled and include pilot cables.

Overhead conductors include earthing systems

Plant may include elevating work platform, winches and capstans, specialist tension stringing equipment, cable trailers, cable drum stands and equipotential equipment.

Testing and recording equipment includes, insulation resistance testers, recording meters and other approved devices and techniques applicable to the voltage.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform

RANGE STATEMENT

- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Transmission Units

UETTD RTP35A Install/maintain transmission network infrastructure electrical equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of non-energised, pyramid, delta, Pi or enterprise specific transmission towers and associated hardware and, the inspection as per requirements of overhead structures such as towers and electrical apparatus. Overhead structures include towers and overhead conductors and or cables include, underground and overhead transition points, electrical equipment, hardware and or earthing systems. This unit encompasses the repair, and or replacement of components in accordance with construction plans, specifications, work orders and standing enterprise requirements. Maintenance could also involve cleaning and welding. The updating of system data, records and or completion of relevant documentation in accordance with enterprise requirements also forms part of this competency.

Application of the Unit

Application of the Unit 2)

This Competency Standard Unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment

Prerequisite Unit(s)	4)
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UEENEEG103A	Install low voltage wiring and accessories
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits

Prerequisite Unit(s) 4)

UEENEEK142A	Apply environmentally and sustainable energy procedures in the energy sector
UETTDREL16A	Working safely near live electrical apparatus
UETTD RIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
UETTD RIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
UETTD RIS67A	Solve problems in energy supply network equipment
UETTD RTP34A	Install/maintain overhead transmission network infrastructure

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to install and maintain transmission network infrastructure electrical equipment	1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.
	1.3 OHS policies and procedures related to requirements and established procedures for the installation and maintenance of transmission network infrastructure electrical equipment are obtained and confirmed for the purposes of the work to be performed and communicated.
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
	1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.
	1.6 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
	1.7 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.

ELEMENT

PERFORMANCE CRITERIA

- 1.8 Relevant personnel at work site are confirmed current in First Aid, Tower/Pole Top Rescue and other related work procedures according to requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.
- 1.12 Traffic management plan is identified and implemented.
- 2 Carry out the installation and maintenance of transmission network infrastructure electrical equipment
 - 2.1 OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
 - 2.2 Towers and associated hardware to be erected are stabilised according to requirements.
 - 2.3 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
 - 2.4 Essential knowledge and associated skills are applied in the safe installation and maintenance of transmission network infrastructure electrical equipment to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
 - 2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported

ELEMENT

PERFORMANCE CRITERIA

- to the immediate authorised persons for directions according to established procedures.
- 2.6 Inspection of overhead structures and electrical apparatus used on towers is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.7 Maintenance, including repair and/or replacement of towers is carried out, in accordance with the work schedule and requirements/established procedures.
- 2.8 Unplanned events in the erection of towers and associated hardware are undertaken within the scope of established procedures.
- 2.9 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
- 2.10 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
- 3 Complete the installation and maintenance of transmission network infrastructure electrical equipment
- 3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
- 3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
- 3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures.
- 3.5 Relevant work permit(s) are signed off and, towers and associated hardware are returned to service in accordance with requirements.
- 3.6 Works completion records, reports, as installed /modified drawing and/or documentation and

ELEMENT

PERFORMANCE CRITERIA

information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining transmission towers and associated hardware.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP35A Overhead transmission network infrastructure electrical equipment

Evidence shall show an understanding of the installation and maintenance of overhead transmission network infrastructure electrical equipment to an extent indicated by the following aspects:

T1 Procedures for routine maintenance on transmission structures and hardware encompassing:

- Procedures for gaining access permits
- Reasons for gaining access
- Types of maintenance procedures on transmission structures - procedure to follow for inspection/patrols according to the Transmission Supply Authority
- Erecting and removing of transmission equipment and hardware from a tower - climbing procedures, square rigging principles, calculation of forces at work within a given square rigging system, construction of a square rigging system.
- Procedures for changing insulators - vertical angle suspension, strain insulator, post insulator (horizontal or vertical) and bridge insulator, calculation of conductor forces
- Installation of temporary work platforms - types and function of installation tools and equipment, precautions and work methods to follow, procedures for installations of temporary work platforms.
- Installation of conductor protective hardware - types and selection of common dampers, tools and equipment, control of Aeolian vibration, procedures for the installation of dampers onto conductors.
- Dead line insulator washing - Supply Authority regulations, procedure for washing de-energised transmission lines.

T2 Inspection of towers and structures used for transmission lines encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Characteristics of materials used for towers structures within the electrical transmission system - faults that occur that influence the integrity of the structure
- Deterioration prevention techniques - relationship between steel, and other materials, inspection procedures for deterioration, deterioration prevention procedures in steel.

REQUIRED SKILLS AND KNOWLEDGE

- Procedures for the repair of deterioration in steel

T3 Inspection of transmission lines encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements
- Clearances and safety procedures
- Ground line inspection procedures of electrical transmission lines - requirements for inspection of transmission lines and insulators, use of specific equipment and testing devices during testing/inspection, techniques in transmission line inspection, methods of recording data.
- Overhead line inspection procedures of electrical transmission lines - methods and requirements for overhead line inspection on electrical structures, clearances for overhead conductors, cables and structures, techniques used to obtain close inspection of transmission lines, use of specific equipment and testing devices during testing/inspection.
- Methods of recording data

T4 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker's body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair
- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew

REQUIRED SKILLS AND KNOWLEDGE

familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered

will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Maintain any one of the following types of towers:	Pyramid Delta pi Enterprise specific type
B	With regards to "A" incorporate at least two of the following	Insulators Clamps Bolts Structural components
C	With regards to "A" incorporate at least one of the following:	Welding Cleaning
D	Inspect at least four of the following:	Towers Overhead conductors/cables Structural fittings Electrical Equipment Hardware. Earthing systems
E	With regards to "D" incorporate at least two of the following:	Visual* Infra-red camera X-Ray Camera Binoculars/telescope (* must do)
F	With regards to "D" incorporate all of the following:	Reporting procedures Reporting outcomes

G	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of transmission network infrastructure electrical equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of transmission network infrastructure electrical equipment in accordance with construction plans and specifications

Tower types may include pyramid, delta and pi and other enterprise specific types.

Maintenance may include the removal, repair and replacement of tower components, including welding where appropriate; and the replacement, repair and cleaning of associated hardware.

Inspection may be carried out on foot, and/or by conventional ground-based vehicle, or from the air. Aircraft may be helicopters or fixed-wing types.

Inspection techniques include use of X-ray and infrared camera.

Items to be inspected may include towers but not overhead poles and or structures.

Types of electrical apparatus to be inspected include overhead conductors, cables, hardware and footings, underground cables and overhead transition points and, electrical equipment such as pole-mounted transformers and air-break switches, hardware and or earthing systems.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention

RANGE STATEMENT

- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Transmission Units

UETTD RTP99A Test and verify transmission overhead installations

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the visual inspection and verification of maintenance requirements of nonenergised, pyramid, delta, Pi or enterprise specific transmission towers and associated hardware. It includes the repair, and or replacement of components in accordance with construction plans, specifications, work orders and standing enterprise requirements. The updating of system data, records and or completion of relevant documentation in accordance with enterprise requirements also forms part of this competency.

Application of the Unit

Application of the Unit 2)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit require a license to practice in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where

License to practice**3)**

applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the access to High Voltage transmission line network installations, operation of plant, machinery and equipment such as elevating work platforms, power operated tools, vehicles, road signage and traffic control and lifting equipment.

2. Compliance may be required in various jurisdictions relating to currency in Working Safely at Heights, ESI Rescue Procedures, CPR/First Aid, lifting and risk safety measures.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules,

Prerequisite Unit(s)	4)	standards, codes and specifications
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. Circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
	UETTDREL16A	Working safely near live electrical apparatus
	UETTD RIS54A	Install and maintain poles, structures, overhead conductors and cables
	UETTD RTP26A	Install transmission structures and associated hardware
	UETTD RTP27A	Maintain transmission structures and associated hardware
	UETTD RTP29A	Install and maintain transmission overhead conductors and cables
	UETTD RTP30A	Inspect transmission overhead structures and electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare to visually inspect, verify and replace or repair overhead transmission installations	1.1	Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.
		1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
		1.3	OHS policies and procedures related to requirements and established procedures for accessing, transmission overhead installations are obtained and confirmed for the purposes of the work to be performed and communicated.
		1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.
		1.5	Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept

ELEMENT**PERFORMANCE CRITERIA**

- clear according to established procedures
- 1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.
- 1.8 Relevant personnel at worksite are confirmed current in First Aid, Tower/Pole Top Rescue and other related work procedures according to requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.
- 1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures
- 1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.
- 2 Carry out visual inspection verification and replacement or repair of overhead transmission installations
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.
- 2.2 Lifting, climbing, working aloft, use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.
- 2.3 Essential knowledge and associated skills are applied in the inspection, verification and safe of

ELEMENT	PERFORMANCE CRITERIA
	overhead transmission installations to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.
2.4	Test/verify and confirm transmission overhead installations are de-energised and able to be earthed in strict accordance with established earthing procedures
2.5	Overhead transmission installations and associated hardware is visually inspected and confirmed as positioned, secured and terminated/connected in accordance with requirements and established procedures.
2.6	Overhead transmission installations are checked for suitability and conformance with organisational construction standards and electrical network supply standards
2.7	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
2.8	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills.
2.9	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the visual inspection verification and replacement or repair of overhead transmission installations.	3.1 OHS risk control work completion measures and procedures are followed.
	3.2 Work undertaken is checked against works schedule for conformance with requirements and anomalies corrected/reported in accordance with established procedures.
	3.3 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.4 Work site is rehabilitated, cleaned up and made

ELEMENT**PERFORMANCE CRITERIA**

- safe in accordance with established procedures.
- 3.5 Non-compliance defects are identified, corrected and/or reported in accordance with established procedures.
- 3.6 Recommendations for rectifying defects are made in accordance with established procedures.
- 3.7 Mandatory documentation is completed in accordance with established procedures.
- 3.8 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.9 Relevant work permit(s) are signed off and, electrical equipment (network infrastructure) are returned to service in accordance with requirements.
- 3.10 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of inspecting overhead structures and electrical apparatus (poles /structures).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTP99A Test and verify transmission overhead installations

Evidence shall show an understanding of transmission overhead installations inspection and verification to an extent indicated by the following aspects:

T1 Legislated regulations encompassing:

- legislation and regulations that require installations and equipment to be inspected and tested to ensure they are safe.
- the person/bodies responsible for the various aspects of ensuring transmission overhead installations are safe.
- results of inspections and tests that show transmission overhead installation is safe for connection to the supply.
- results of periodic inspection and tests that show construction and installation of equipment is safe to use.
- results of periodic inspection and tests that show the transmission overhead installations electrical equipment are safe to use.

T2 Testing installations encompassing:

- Transmission system phasing is correct and conforms to network construction standards.
- Electrical transmission network voltage levels comply with network supply standards.
- Potential present upon transmission network neutral conductors conforms network supply standards.
- Insulation resistance is adequate
- transmission earthing system components are verified as correctly installed

T3 Documentation encompassing:

- results of inspections and tests conducted on a transmission overhead installation are in accordance with work package requirements and ensure the transmission overhead installation is safe.
- documents of periodic inspection and testing of transmission overhead installation and equipment in accordance with requirement.
- Non-compliances and defects reported in accordance with established procedures

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships.

However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment

Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum	Item List

	number of items on which skill is to be demonstrated	
A	At least two of the following:	Visual* Infra-red camera X-Ray Camera Binoculars/telescope (* must do)
B	Any one of the following:	Pyramid Delta pi Enterprise specific type
C	At least three of the following	Insulators Clamps Bolts Conductor spacers Vibration dampers Structural components
D	At least one of the following	Copper Aluminium Steel Aluminium/steel reinforced
E	At least two of the following	Elevated work platform Portable platform Gondola Hook ladder* Elevated work box (*must do)
F	All of the following	Voltage/ de-energised indicating device Earthing conductors

G	All of the following	Reporting procedures Reporting outcomes
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Network constructions standards
- Network supply standards
- Suitable work environment, facilities, equipment and materials to undertake actual inspection of overhead structures and electrical apparatus.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working aloft (upon pole/structure or from EWP), below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this Competency Standard Unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation, inspection and maintenance of overhead transmission installations and includes

Transmission network installations and associated hardware which may include relevant transmission line/network high voltage overhead; conductors, groundwires, insulators, structural members, structural hardware, vibration dampers, conductor spacers, conductor repair, performed patch rods

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the

Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Authorisation
- Confined space
- Pre-commissioning testing and measurement
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Quality assurance systems
- Network construction standards
- Network supply standards
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Transmission

UETTDRTS21A Maintain interdependent network protection and control systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of network protection and control in interdependent situations and includes isolation, inspection, monitoring, testing, adjustment, and repair, refurbishment and or overhaul and functional checks of interdependent network protection and control systems. It includes the requirements to prove the functionality of interdependent and discrete schemes such as, CB Fail, master controlled Earth Fault, inter-tripping, blocking, synchronising, pilot wire, phase comparison, load shedding, voltage control, parallel operation and load rejection.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice

3)

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for

Prerequisite Unit(s)	4)	problems in complex multiple path circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRTS29A	Develop power systems secondary isolation instructional documents

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the maintenance of network protection and control systems (interdependent)	1.1	OHS practices/procedures and Environmental and sustainable energy procedures, which may influence the maintenance of, network protection and control systems (interdependent) are reviewed and determined.
		1.2	Purpose of the maintenance of network protection and control systems (interdependent) is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the maintenance of network protection and control systems (interdependent) are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.

ELEMENT

PERFORMANCE CRITERIA

- 1.5 Testing parameters are established from organisational established procedures on policies and specifications.
- 1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
- 1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
- 1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
- 1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 2 Carry out the maintenance of network protection and control systems (interdependent)
 - 2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
 - 2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
 - 2.3 Maintenance of network protection and control systems (interdependent) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
 - 2.4 Mathematical and/or engineering models of the scheme are used to analyse the effectiveness of

ELEMENT	PERFORMANCE CRITERIA
	the finished project as per requirements and established procedures.
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7 Testing of network protection and control systems (interdependent) is undertaken according to requirements and established procedures.
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
	2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
3 Complete the maintenance of network protection and control systems (interdependent)	3.1 Final inspections of the network protection and control systems (interdependent) are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
	3.2 Appropriate personnel are notified of completion and reports and/or completion

ELEMENT

PERFORMANCE CRITERIA

documents are finalised/commissioned.

3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.

3.4 Approved copies of the maintenance of network protection and control systems (interdependent) documents are issues and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining network protection and control systems (interdependent).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS21A Interdependent network protection and control systems

Evidence shall show an understanding of the interdependent network protection and control systems to an extent indicated by the following aspects:

T1 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T2 Electrical equipment associated with protection and control schemes encompassing:

- Types and applications of electrical equipment – characteristics, capabilities (schemes: overcurrent, frame leakage, cooling, buchholz, DC supplies, restricted earth, sensitive earth fault, CB fail, reclose, DC frame leakage, CEL Fail, under frequency load shed and earth fault)

T3 Principles of isolation and tagging procedures associated with protection testing encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
- Requirements for the use of, isolation and tagging, manuals, system diagrams/plans and drawings
- Techniques in documenting isolations
- Techniques in appropriate isolation and tagging procedures as per Commonwealth/State/Territory legislation, supply authority regulations and enterprise standards
- Techniques in the installation and maintenance procedures protection devices as per Commonwealth/State/Territory legislation, supply authority regulations and enterprise standards

T4 Maintenance and commissioning procedures associated with discrete protection schemes encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the maintenance and commissioning procedures
- Requirements for the use of maintenance and commissioning manuals, system diagrams/plans and drawings
- Techniques in maintenance and commissioning procedures – planning, policy, testing techniques
- Close out requirements

T5 Relay manufacturer specifications encompassing:

- Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of relay manufacturer specifications
- Requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
- Types, function and characteristics of specific relays - differences between specific relays used for the same functionality

T6 Safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants encompassing:

- Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the handling and disposing of insulation or heat dissipation materials used in power distribution devices
- Identification of environmental issues associated with the handling and disposing of insulation materials
- Safety precautions when handling and disposing of heat dissipation materials - safe working practices, Occupational Health and Safety hazards and precautions, identification of hazards, assessing and controlling risks, types, selection, maintenance and uses of personnel protective equipment, permit to work systems and isolation procedures, types and function of specialised equipment, safe working practices when using specialised equipment, emergency response and rescue including First Aid etc.
- Techniques in the handling and disposing of insulation materials - Polychlorinated Bi-Phenyls (PCB's), asbestos, insulating Oil, SF6 gas.

T7 Procedure to undertake a visual inspection of a scheme encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with visual inspection procedures of a scheme
- Requirements for the use of manuals, system diagrams/plans and drawings
- Identify obvious deficiencies in operating to the standard functionality
- Techniques in determining relay malfunction - targeting
- Techniques in determining wiring defects

T8 Operation and maintenance procedures associated with discrete protection and

REQUIRED SKILLS AND KNOWLEDGE

control systems encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with operating procedures
- Requirements for the use of operating manuals, system diagrams/plans and drawings
- Techniques - gas collection and analysis, bleeding and resetting, calibration, operational and sensitivity checks, trip and alarm checks
- Surge relay types and uses, including transformer main tanks, diverter switch chambers

T9 Measurements and the interpretation and analysis of those measurements related to the plant and/or equipment type encompassing:

- Type of measurements - timing, current, voltage, capacitance, inductance, impedance, phase angle, phase shift, resistance, dielectric dissipation factor, frequency, polarisation index, ratio, vector group, temperature
- Interpretation and analysis the use of techniques - digital comparison of data, extrapolation, use of graphs and charts, statistics and tables, mathematical calculation of expected values and comparison with manufacturers data and measurements
- Techniques in the processes involved in follow-up actions and recommendations resulting from analysis and interpretation of results and measurements.

T10 Infrared imaging principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Infrared Imaging
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types of enterprise specific computer software
- Techniques in storing and retrieving data and reports from the computer
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for Infrared Imaging reporting
- Techniques in evaluating serviceability of circuit breaker operation
- Procedures for obtaining correct HV switchyard arrangements - identification of hazards and controlling risks, safety procedures and precautions, responsibilities and protocols, identifying switching resources
- Safety precautions when testing and measuring equipment with Infrared Imaging - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols.

T11 Commissioning procedures associated with distribution protection and control systems encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures

REQUIRED SKILLS AND KNOWLEDGE

- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures – planning, policy, testing techniques
- Close out requirements

T12 Operation and maintenance procedures associated with voltage regulation schemes encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the operating procedures
- Requirements for the use of operating manuals, system diagrams/plans and drawings
- Principles of operation and operating sequences - voltage control, VAR control, Live Bus/Dead Bus synchronising checks, tap changer principles, requirements for parallel operations, settings, grading
- Techniques associated with - isolation requirements, enterprise maintenance requirements, setting checks, LV injections, electrical measurements
- Ancillary equipment which may include transducers, Buswire schemes, tap position indicators, local/remote control systems, alarm systems
- Voltage regulation scheme types which may include electro mechanical, micro-processor or combinations of both.

T13 Types and applications of test equipment encompassing:

- Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of electrical and/or electronic test equipment
- Types and applications of test equipment used on discrete protection scheme
- Techniques in the use of test equipment - electronic test equipment (Doble, Ohmicrome), gas injection equipment, manufactures test equipment, multimeters, phase angle meters, meggers.

T14 Electrical equipment associated with distribution field device protection and control schemes encompassing:

- Types and applications of electrical equipment – characteristics, capabilities (schemes: automatic circuit reclosers (ACR's), gas switches, secondary injection tests, primary injection tests, TMR Radio's, SCADA, remote control, overcurrent, earth fault, sensitive earth fault, inverse time curves, definite time curves, tripping, reclose, DC supplies, AC supplies and alarms)

T15 Circuit breaker auxiliary systems encompassing:

- Types and characteristics of high pressure air systems including air storage and air handling processes
- Types and characteristics of DC systems including battery types, charging systems, protection systems
- Types and characteristics of special ambient gases (SF6) systems including gas

REQUIRED SKILLS AND KNOWLEDGE

conditioning, storage and handling systems

- Types and characteristics of vacuum interrupters
- Types and characteristics of oil filled and oil handling

T16 Detailed operation and setting of discrete protection systems encompassing:

- Earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination, backup protection
- Overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination, backup protection
- Alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, over temperature schemes

T17 Detailed operation of interdependent protection systems encompassing:

- Overcurrent and earth leakage schemes including intertripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic, shading coils
- Pilot wire, phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme, pilot supervisory techniques,
- Load shedding, voltage control, parallel operation, load rejection
- Busbar Protection and CB failure protection
- Reclose systems - applications, single shot, multishot, blocking schemes, synchronisation checking.

T18 Procedures for the location and rectification of faults in electrical equipment up to 1000 volts AC and or 1500 volts DC, encompassing:

- Relationship of Occupational Health and Safety to the location and rectification of faults in electrical equipment - Act and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency First Aid/resuscitation, rescue from a live electrical situation, enterprise policies and procedures.
- Types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment, fault-finding techniques and procedures
- Fundamental electrical concepts - effects of current, practical resistors, sources of EMF, series, parallel and series-parallel circuits, electrical measurement, capacitors, inductors, magnetism.
- Fundamentals of general appliances - basic principles of appliances (non mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in appliances, fault-finding procedures

REQUIRED SKILLS AND KNOWLEDGE

(prescriptive)

- Fundamentals of single phase induction motors - basic principles of operation (non mathematical), motor identification, motor ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedure, including continuity, fault types in “phase splitting” and universal type motors, fault-finding procedures (prescriptive).
- Fundamentals of three phase induction motors - basic principles of operation (non mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedure, fault-finding procedures (prescriptive)
- Fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedure, fault-finding procedures (prescriptive).

T19 Disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts AC and or 1500 volts DC, encompassing:

- Safe electrical work practices and procedures according to standards such as AS/NZ 4836:2001 or equivalent
- Safe use of tools and plant
- Safe use of ladders and elevated work platforms
- Safe use of protective clothing
- Hazards in the (electrical) work environment - shock hazards, fire hazards, chemical hazards, other hazardous areas
- Special situations
- Procedures for dealing with fires associated with electrical equipment
- Procedures for dealing with PCBs
- Electric shock victim rescue methods and procedures - basic First Aid treatment for shock, burns and bleeding.
- Purpose of each procedure and application - expired air resuscitation (EAR), external cardiac-compression (ECC), cardio-pulmonary resuscitation (CPR), combined application of EAR and ECC (purpose of each procedure and application).
- Components of a basic electrical circuit(s) – source, control, protection, load
- Types of circuit diagrams – symbols, conventions, interpretations, free sketches
- Types of circuit connections and functions - open circuit, closed circuit, short circuit
- Techniques in basic electrical measurement - use of multimeters; use of ammeter; use of voltage measuring and indicating devices; testing of measuring instruments; care of measuring instruments; voltage, current and resistance measurement; estimating values of voltage, current and resistance; using ohms law

REQUIRED SKILLS AND KNOWLEDGE

- Fundamental principles of electrical concepts - effects of current; practical resistors; sources of EMF; simple practical circuit; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors; magnetism
- Techniques in insulation resistance measurement and requirements
- Earthing principles and systems.

T20 Disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts AC and or 1500 volts DC, encompassing:

- Methods for testing insulation resistance - continuity of prospective earthing conductor, continuity between exposed conductive parts and the earthing system
- Methods of recognising acceptable test results for compliance with safety requirements
- Methods of recognising unacceptable test results and require an appropriate qualified person to further investigation
- Cable types and conductor termination methods and techniques - conductors solid, stranded and flexible, colour codes
- Single and three phase systems and loads - number of active and live conductors required, line and phase voltage, typical loads
- Identification and rating of general appliances
- Single phase induction motors - motor identification, motor ratings, direction of rotation
- Three phase induction motors - motor identification, motor ratings, direction of rotation
- Single and three phase heaters - types of heaters, heater identification, heater ratings
- Electrical distribution arrangement - power systems within premises, purpose of switchboards/distribution boards (residual current devices and ELCBs)
- Circuit isolation and protection devices
- Isolation procedures - work clearance, testing for voltage, lock-off and tagging, techniques in isolation and tagging, regulation, codes of practice and procedures
- Disconnection procedures, practices and requirements
- Types of replacement equipment
- Methods of ensuring equipment is safe to connect to supply
- Methods of reconnection procedures, practices and requirements
- Methods of return equipment to service

T21 Effects of harmonics encompassing:

- Characteristics and effects of harmonics on protection device functions/malfunction
- Effects of harmonics on transformers, generators, motors, quality of supply.

Evidence Guide

EVIDENCE GUIDE

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Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Demonstrate five (5) times each of the following activities:	<p>Isolate protection, control and alarms associated with interdependent protection and control schemes. Five of the protection groups as stated in the Range Statement of this unit must be included.</p> <p>Calibrate interdependent protection and control relays from at least 5 of the protection groups as stated in the Range Statement of this unit;</p> <p>Carry out function tests (trips, alarms etc.) on interdependent protection and control schemes. Five of the protection groups as stated in the Range Statement of this unit must be included.</p> <p>Write reports on performance of interdependent protection and control schemes. Five of the protection groups as stated in the Range Statement of this unit must be included</p> <p>Isolate 'in service' current transformers</p>
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate

		solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of network protection and control systems (interdependent).
- Operational access to relevant plant, protection equipment, scheme drawings and specialised testing equipment

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of network protection and control systems (interdependent) and may include the following:

Overcurrent, Frame leakage, Cooling, Buchholz, DC Supplies, Restricted Earth, Sensitive Earth Fault, CB Fail, Reclose, DC Frame leakage, CEL Fail, Under Frequency load shed

Instrument Transformers, Trip/Control circuits, Alarms, DC Supplies, CB Fail protection, Master controlled Earth Fault, Intertripping, Blocking, Synchronising, Pilot Wire, Phase Comparison, Load Shedding, Voltage control, parallel operation, load rejection, circuit isolations and restorations, mechanical adjustments, calibration, function tests, reporting, signals, thermals, contraphase, backup, reverse current

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation

RANGE STATEMENT

- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems.
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Testing Units

UETTDRTS22A Commission interdependent network protection and control systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the commissioning of network protection and control systems in interdependent situations and includes isolation, inspection, monitoring, testing, adjustment, and repair, refurbishment and or overhaul and functional checks. It also includes schemes such as, CB Fail, master controlled Earth Fault, impedance and differential relays intertripping, blocking, synchronising, pilot wire, phase comparison, load shedding, voltage control, parallel operation and load rejection. This includes commissioning of discrete and interdependent schemes.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice

3)

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for

Prerequisite Unit(s)	4)	problems in complex multiple path circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRLS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRLS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRTS21A	Maintain interdependent network protection and control systems
	UETTDRTS29A	Develop power systems secondary isolation instructional documents

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the commissioning of network protection and control systems (interdependent)	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of, network protection and control systems (interdependent) are reviewed and determined.
		1.2	Purpose of the commissioning of network protection and control systems (interdependent) is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the commissioning of network protection and control systems (interdependent) are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the

ELEMENT	PERFORMANCE CRITERIA
	project brief.
	1.5 Testing parameters are established from organisational established procedures on policies and specifications.
	1.6 Equipment/tools and personal protective equipment is selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the commissioning of network protection and control systems (interdependent)	<p>2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.</p> <p>2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.</p> <p>2.3 Commissioning of network protection and control systems (interdependent) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.</p> <p>2.4 Mathematical and/or engineering models of the schemes are used to analyse the effectiveness of</p>

ELEMENT

PERFORMANCE CRITERIA

- the finished project as per requirements and established procedures.
- 2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing of network protection and control systems (interdependent) is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
- 3 Complete the commissioning of network protection and control systems (interdependent)
- 3.1 Final inspections of the network protection and control systems (interdependent) are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.

ELEMENT

PERFORMANCE CRITERIA

- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of the commissioning of network protection and control systems (interdependent) documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of commissioning network protection and control systems (interdependent).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS22A Interdependent network protection and control systems - commissioning

Evidence shall show an understanding of the interdependent network protection and control systems commissioning to an extent indicated by the following aspects:

T1 Commissioning procedures associated with discrete protection and control systems encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures – planning, policy, testing techniques, close out requirements.

T2 Principles of power transformer construction and operations encompassing:

- Applications of static reactive plant in high voltage networks, including voltage control, VAR control, transient response capacity
- Types of static reactive plant including high voltage capacitors, high voltage reactors, static VAR compensators and combinations of these
- Operating characteristics and operational constraints including point on wave switching issues
- Ratings, cooling systems and control systems and ancillary equipment used
- Configurations and system layout including single star, double star, bridge type
- Typical protection systems used including neutral unbalance current, neutral unbalance voltage
- Techniques used when balancing elements within static reactive plant
- Safety precautions when testing and maintaining high voltage static reactive plant - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Demonstrate commissioning a protection and control system involving at least five (5) of the following:	CB fail protection Master controlled earth fault Intertripping Blocking Synchronising Pilot wire Phase comparison Load shedding Voltage control protection Frame leakage Delta current Reverse power.
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual commissioning of network protection and control systems (interdependent).
- Operational access to relevant plant, protection equipment,

scheme drawings and specialised testing equipment

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) his relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the commissioning of network protection and control systems (interdependent) and may include the following:

Overcurrent, Frame leakage, Cooling, Buchholz, DC Supplies, Restricted Earth, Sensitive Earth Fault, CB Fail, Reclose, DC Frame leakage, CEL Fail, Under Frequency load shed

Instrument Transformers, Trip/Control circuits, Alarms, DC Supplies, CB Fail protection, Master controlled Earth Fault, Intertripping, Blocking, Synchronising, Pilot Wire, Phase Comparison, Load Shedding, Voltage control, parallel operation, load rejection, circuit isolations and restorations, mechanical adjustments, calibration, function tests, reporting, signals, thermals, contraphase, backup, reverse current

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation

RANGE STATEMENT

- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Testing Units

UETTDRTS23A Conduct evaluation of power system substation faults

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the procedure in evaluating power system incidents by following a process of downloading event and disturbance record information from protection relays. This includes interpreting such items as, alarms, relay targets, relay settings, event records, disturbance records and sequence of events records. It also encompasses the evaluation and or investigation of relay operation, relay schemes functionality and relay settings.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 6 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice**3)**

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems

Prerequisite Unit(s)	4)	
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of

Employability Skills

5)

competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Plan for the evaluation of power system events	1.1	OHS practices/procedures and Environmental and sustainable energy procedures, which may influence the evaluation of power system failures, are reviewed and determined.
		1.2	Purpose of the evaluation of power system events, are established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the evaluation of power system failures are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Testing parameters are established from organisational established procedures on policies and specifications.
		1.6	Equipment/tools and personal protective equipment are selected based on specified

ELEMENT	PERFORMANCE CRITERIA
	Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the evaluation of power system events	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3 Following evaluation of power system events, decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4 Mathematical and /or engineering models of the evaluation of power system events are used to analyse the effectiveness of the finished project as per requirements and established procedures.
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with

ELEMENT**PERFORMANCE CRITERIA**

- requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing of power system is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
- 3 Complete the evaluation of power system events
- 3.1 Final evaluation of all relevant data pertaining to the power system event is undertaken to ensure the recommendations comply with all requirements and include all specifications and documentations needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of the evaluation of power system event documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of conducting evaluation of power system faults within a substation.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS23A Power system substation faults evaluation

Evidence shall show an understanding of power system substation faults evaluation to an extent indicated by the following aspects:

T1 OHS enterprise responsibilities encompassing:

- Provisions of relevant health and safety legislation
- Principles and practice of effective occupational health and safety management
- Management arrangements relating to regulatory compliance
- Enterprise hazards and risks, control measures and relevant expertise required
- Characteristics and composition of workforce and their impact on occupational health and safety management
- Relevance of enterprise management systems to occupational health and safety management
- Analysis of working environment and design of appropriate occupational health and safety management systems
- Analysis of relevant data and evaluation of occupational health and safety system effectiveness
- Assess resources to establish and maintain occupational health and safety management systems.

T2 Power distribution network documentation encompassing:

- Requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of OHS risks
- Types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, instruction/worksheets sheets.
- Interpretation of different diagrams and documentation on LV and HV systems - overhead distribution extensions, underground distribution extensions, distribution substation, street lighting system

T3 Measurements and the interpretation and analysis of those measurements related to the plant and/or equipment type encompassing:

- Type of measurements - timing, current, voltage, capacitance, inductance, impedance, phase angle, phase shift, resistance, dielectric dissipation factor,

REQUIRED SKILLS AND KNOWLEDGE

frequency, polarisation index, ratio, vector group, temperature

- Interpretation and analysis the use of techniques - digital comparison of data, extrapolation, use of graphs and charts, statistics and tables, mathematical calculation of expected values and comparison with manufacturers data and measurements
- Techniques in the processes involved in follow-up actions and recommendations resulting from analysis and interpretation of results and measurements.

T4 System components and layouts encompassing:

- Distribution system layouts - overhead/underground, urban/rural, HV customers, high rise building systems, three phase lines, single phase lines, SWER systems, spur, parallel and ring systems, typical substation types.
- Transmission system layouts - lines, buses, transformers and cables, line/bus layouts including single, double, ring and breaker and half systems, HV crossing methods.

T5 Calculation of fault levels encompassing:

- Calculation of fault levels in symmetrical and asymmetrical fault conditions - types of faults, interconnected and radial systems, symmetrical components, representation of voltages and currents, sequence impedances of system plant, calculation/determination of sequence impedance networks, determination of operative sequence impedances, fault or arc impedances, first approximation techniques
- Interrupting device capabilities - determination of fault current breaking capability and let through energy capability of fuses and circuit breakers, DC offset and transient condition effects

T6 Protection system types encompassing:

- Requirements of a protection scheme - relationship to primary system design, purpose of protection, safety of persons, protection of plant, system instability, system break up, loss of customers, loss of revenue, protection zones, restricted schemes, unrestricted schemes, duplicate protection, local backup protection, remote backup protection, selectivity, discrimination, stability, sensitivity, reliability
- Components of a protection scheme - current transformers, potential transformers, summation current transformers, interposing transformers, multitapped transformers, all-or-nothing relays, induction relays, balanced beam relays, directional relays, biased relays, solid state relays, microprocessor based relays, gas relays, thermal sensors, hardwired communication, powerline carriers systems, microwave systems, fibre optic systems, need for isolation, need for interfacing
- Protection applied to buses - overload, differential, earth leakage, structure leakage, combined schemes, protection overlap
- Protection applied to transformers - biased differential, gas, winding temperature, oil temperature
- Protection applied to single/radial lines - overcurrent, earth leakage, slow earth

REQUIRED SKILLS AND KNOWLEDGE

leakage, distance, auto reclose, sectionalising, over voltage

- Protection applied to interconnected lines - overcurrent, pilot wire, directional, directional overcurrent, current differential, phase comparison, current comparison, distance, impedance, admittance, offset

T7 Detailed operation and setting of discrete protection systems encompassing:

- Earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination, backup protection
- Overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination, backup protection
- Alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, over temperature schemes

T8 Detailed operation of interdependent protection systems encompassing:

- Overcurrent and earth leakage schemes including intertripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic, shading coils
- Pilot wire, phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme, pilot supervisory techniques,
- Load shedding, voltage control, parallel operation, load rejection
- Busbar Protection and CB failure protection
- Reclose systems - applications, single shot, multishot, blocking schemes, synchronisation checking.

T9 Detailed operation of complex protection systems encompassing:

- Distance - characteristics, electromechanical, electronic, impedance, mho, offset mho, switched schemes, non-switched schemes, blocking schemes, bus zone
- Differential, transformer differential, bus overcurrent - principles, feeder protection, transformer protection, bias systems, harmonic restraint, CT connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, CT connections, special considerations, digital systems
- Types of revenue metering
- Applications of SCADA
- Complex protection systems for communications
- Harmonic control
- Point on wave switching

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Demonstration of at least two (2) downloads from protection relays or recording equipment from each of the following:	Relay panel Remote location
B	Development of five (5) evaluation reports on power system events including the following:	Interpretation of targets in a substation Interpretation of fault reports Interpretation of downloaded event data Development of valid conclusions and recommendations.
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual evaluation of power system events.
- Operational access to relevant plant, protection equipment, event data, scheme drawings and specialised testing equipment

In addition to the resources listed above, in Context of and specific

resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to evaluating power system events that effect substation equipment and may include the following: secondary equipment, feeder outage, disturbance recorders, alarms, transformers, circuit breakers, DC supplies, SCADA and busbars.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Testing Units

UETTDRTS24A Design testing and commissioning procedures for field devices and substations

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the testing and commissioning procedures for new substation and field devices in accordance with design. This will involve analysis of settings, and a thorough understanding of the circuit design, which will involve covering such areas as metering, communication circuits and SCADA. It also includes the procedures needed to enable proof of correct operation of all circuits to design specifications. It also encompasses the need for supplying accurate communication in the format that is acceptable to the Operating or Testing Authority.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 6 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice

3)

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for

Prerequisite Unit(s)	4)	problems in complex multiple path circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRL62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRL63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	Protection Relays and Meters Pathway Unit Group	
	UETTDRTS28A	Repair, test and calibrate protection relays and meters
	Metering Pathway Unit Group	
	UETTDRTS25A	Maintain and test and metering schemes
	UETTDRTS26A	Commission power systems metering schemes
	UETTDRTS29A	Develop power systems secondary isolation instructional documents
	Primary Plant Pathway Unit Group	

Prerequisite Unit(s) 4)

UETTDRTS29A	Develop power systems secondary isolation instructional documents
UETTDRTS32A	Conduct evaluation of power systems primary plant
Protection Systems Pathway Unit Group	
UETTDRTS21A	Maintain interdependent network protection and control systems
UETTDRTS29A	Develop power systems secondary isolation instructional documents
UETTDRTS35A	Maintain complex network protection and control systems

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|--|-----|--|
| 1 | Plan for the design of testing and commissioning procedures for substation and field devices | 1.1 | OHS practices/procedures and environmental and sustainable energy procedures, which may influence the undertaking of design of testing and commissioning procedures for substation and field devices, are reviewed and determined. |
| | | 1.2 | Purpose for designing of testing and commissioning procedures for substation and field devices is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel. |
| | | 1.3 | Organisational established procedures on policies and specifications for the design of testing and commissioning procedures for substation and field devices are obtained or established with the appropriate personnel. |
| | | 1.4 | Testing procedures are discussed with the appropriate personnel in order to ascertain the project brief. |
| | | 1.5 | Testing parameters are established from organisational established procedures on policies and specifications |
| | | 1.6 | Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures |
| | | 1.7 | Work roles and tasks are allocated according to requirements and individuals' competencies |
| | | 1.8 | Work is prioritised and sequenced for the most efficient/effective outcome, completed within an |

ELEMENT

PERFORMANCE CRITERIA

		acceptable timeframe to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2	Carry out the design of testing and commissioning procedures for substation and field devices	
	2.1	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2	OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Design testing and commissioning procedures for substation and field devices decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of design testing and commissioning procedures for substation and field devices are used to analyse the effectiveness of the finished project as per requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure

ELEMENT

PERFORMANCE CRITERIA

- completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing and commissioning procedures for substation and field devices are developed according to requirements and established procedures
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards Strategic plans are developed incorporating organisation initiatives as per established procedures.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
- 3 Complete the design of testing and commissioning procedures for substation and field devices
- 3.1 Final review of testing and commissioning procedures for substation and field devices are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
- 3.4 Approved copies of design testing and commissioning procedures for substation and field devices documents are issues and records

ELEMENT

PERFORMANCE CRITERIA

are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing testing and commissioning procedures for substation and field devices.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS24A Testing and commissioning procedures for field devices and substations - design

Evidence shall show an understanding of testing and commissioning procedures for field devices and substations - design to an extent indicated by the following aspects:

T1 Powerline safety practices encompassing:

- Protective apparatus and apparel for linework - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel and the types of protective apparatus and apparel used for the line worker
- Requirements for the use of ladders - carrying, erecting, collapsing and lowering different types of extension ladder against a standing pole, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from overhead conductors
- Requirements for climbing and working aloft - methods used to identify a pole is safe to climb, methods used to inspect a line worker's body belt, application of knots and hitches appropriate to the requirements of a line worker, height safety principles including personal fall protection, prevention and related requirements, and the practical procedure of climbing an overhead structure and fitting a pole chair
- Traffic management - purpose of traffic management and a line worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry requirements, demonstration of the procedure used to provide an effective traffic management scheme and the use of a two-way radio
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires, general fire prevention methods and the precautions for personal protection when fighting small fires
- Rescue victims from heights and confined spaces - planning, identifying, the procedures, and establishing responses, developing techniques, involvement of external emergency services and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim including CPR
- Requirements for aerial linework - planning, establishing and implementing relevant aviation authority clearances, determining system requirements, aircrew familiarisation with network operations and equipment, requirements for effective communications operations for aerial work.

REQUIRED SKILLS AND KNOWLEDGE

T2 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T3 Electrical equipment associated with protection and control schemes encompassing:

- Types and applications of electrical equipment – characteristics, capabilities (schemes: overcurrent, frame leakage, cooling, buchholz, DC supplies, restricted earth, sensitive earth fault, CB fail, reclose, DC frame leakage, CEL Fail, under frequency load shed and earth fault)

T4 Principles of isolation and tagging procedures associated with protection testing encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
- Requirements for the use of, isolation and tagging, manuals, system diagrams/plans and drawings
- Techniques in documenting isolations
- Techniques in appropriate isolation and tagging procedures as per Commonwealth/State/Territory legislation, supply authority regulations and enterprise standards
- Techniques in the installation and maintenance procedures protection devices as per Commonwealth/State/Territory legislation, supply authority regulations and enterprise standards

T5 Maintenance and commissioning procedures associated with discrete protection schemes encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the maintenance and commissioning procedures
- Requirements for the use of maintenance and commissioning manuals, system diagrams/plans and drawings
- Techniques in maintenance and commissioning procedures – planning, policy, testing techniques
- Close out requirements

T6 Relay manufacturer specifications encompassing:

- Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of relay manufacturer specifications

REQUIRED SKILLS AND KNOWLEDGE

- Requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
- Types, function and characteristics of specific relays - differences between specific relays used for the same functionality

T7 Procedure to undertake a visual inspection of a scheme encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with visual inspection procedures of a scheme
- Requirements for the use of manuals, system diagrams/plans and drawings
- Identify obvious deficiencies in operating to the standard functionality
- Techniques in determining relay malfunction - targeting
- Techniques in determining wiring defects

T8 Operation and maintenance procedures associated with discrete protection and control systems encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with operating procedures
- Requirements for the use of operating manuals, system diagrams/plans and drawings
- Techniques - gas collection and analysis, bleeding and resetting, calibration, operational and sensitivity checks, trip and alarm checks
- Surge relay types and uses, including transformer main tanks, diverter switch chambers

T9 Measurements and the interpretation and analysis of those measurements related to the plant and/or equipment type encompassing:

- Type of measurements - timing, current, voltage, capacitance, inductance, impedance, phase angle, phase shift, resistance, dielectric dissipation factor, frequency, polarisation index, ratio, vector group, temperature
- Interpretation and analysis the use of techniques - digital comparison of data, extrapolation, use of graphs and charts, statistics and tables, mathematical calculation of expected values and comparison with manufacturers data and measurements
- Techniques in the processes involved in follow-up actions and recommendations resulting from analysis and interpretation of results and measurements.

T10 Substation safety practices encompassing:

- Standards, codes, Commonwealth, State/Territory/local government legislation, supply authority regulations and or enterprise requirements pertaining to substation safety practices
- Techniques in the use of protective apparatus and apparel for substations work, including responsibilities with regard to the use and maintenance of protective apparatus and apparel and the types of protective apparatus and apparel used for work in substations

REQUIRED SKILLS AND KNOWLEDGE

- Requirements for the use of ladders and appropriate ladder types for work in substations - safe work methods when carrying, erecting, collapsing and lowering different types of extension ladder against substation structures, plant and equipment, maintenance checks on different types of ladders, renewal of extension ropes and the safety issues relating to clearances from energised conductors
- Requirements for climbing and working at heights in substations - attached climbing principles, selection, use and operation of elevated work platforms and any OHS requirements associated with the use of EWPs
- Control of small fires - identification, selection and operation of the appropriate extinguishing mediums for various types of fires and the precautions for personal protection when fighting small fires
- Control of oil spills - identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
- Rescue and release procedures - the rescue personnel from energised conductors, emergency descent from an EWP and may include rescue from confined spaces.
- Enterprise requirements - safe access and Authorisation to Work procedures, use of mobile extendable equipment on or near energised HV conductors, emergency response procedures.
- Hazards associated with work in substations including earthing systems, transfer potentials, step and touch effects, electrostatic and electromagnetic induction, dangers of near approach to energised conductors

T11 Design principles of high voltage insulation systems encompassing:

- Insulation design principles - common materials used, electrical characteristics, thermal characteristics, uses and applications to substation high voltage plant and equipment, grading, construction, cooling.
- Common contaminants and their effects - internal contaminants, external contaminants
- Testing and measurement of insulation quality - test types and common measuring instruments and techniques, resistance and resistivity, losses, measurement errors, temperature corrections, safe work practices related to testing and measurement
- Safety precautions when testing and measuring high voltage insulation systems - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment

T12 Principles of power transformer construction and operations encompassing:

- Transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step down transformers, transmission and generation types
- Reactor types - shunt and series, applications and design considerations
- Iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
- Winding configurations and construction techniques - helical, spiral, disc, interleaved disc types

REQUIRED SKILLS AND KNOWLEDGE

- Insulation methods and techniques - fully insulated windings and graded insulation techniques, oil filled and gas filled power transformers
- Transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, impedance percent
- Nameplate details - BIL, tapping winding detail, physical layout, cooling ratings, physical details
- Transformer and reactor cooling types and their effects on design and rating
- Transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
- Winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
- Operating constraints as single units and in parallel
- Tapping windings - placement issues, tapping range, OLTC versus off load TC techniques, types in use (high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types), control system characteristics.
- High voltage bushing selection – type, insulation system used, rating, BIL, selection criteria, testing considerations

T13 Principles of power transformer construction and operations encompassing:

- Applications of static reactive plant in high voltage networks, including voltage control, VAR control, transient response capacity
- Types of static reactive plant including high voltage capacitors, high voltage reactors, static VAR compensators and combinations of these
- Operating characteristics and operational constraints including point on wave switching issues
- Ratings, cooling systems and control systems and ancillary equipment used
- Configurations and system layout including single star, double star, bridge type
- Typical protection systems used including neutral unbalance current, neutral unbalance voltage
- Techniques used when balancing elements within static reactive plant
- Safety precautions when testing and maintaining high voltage static reactive plant - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.

T14 Principles of power transformer high speed on load tap changers encompassing:

- Selector types and applications for high voltage power transformers
- Diverter switch types and applications for high voltage power transformers including live tank, dead tank, resistor type, reactor type, vacuum type, pennant flag, pennant cycle
- Ratings and construction principles
- Operating mechanism types, stored energy systems and associated control systems
- Operating principles and operating sequences of selectors and diverters

REQUIRED SKILLS AND KNOWLEDGE

- Measurement requirements including contacts, differential wear, transition resistors and transient protection devices, rotation lag, out of sequence controls and end-of-life unit and component assessment
- Online diagnostic tools and devices
- Ancillary equipment including online filters, over pressure relays and devices
- Testing requirements including cycle timing, differential delay, energy accumulator mechanical and operational tests and control system functional tests
- Safety precautions when testing and maintaining high voltage power transformer on load tap changers - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.

T15 Operation and maintenance procedures associated with voltage regulation schemes encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the operating procedures
- Requirements for the use of operating manuals, system diagrams/plans and drawings
- Principles of operation and operating sequences - voltage control, VAR control, Live Bus/Dead Bus synchronising checks, tap changer principles, requirements for parallel operations, settings, grading
- Techniques associated with - isolation requirements, enterprise maintenance requirements, setting checks, LV injections, electrical measurements
- Ancillary equipment which may include transducers, Buswire schemes, tap position indicators, local/remote control systems, alarm systems
- Voltage regulation scheme types which may include electro mechanical, micro-processor or combinations of both.

T16 Types and applications of test equipment encompassing:

- Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of electrical and/or electronic test equipment
- Types and applications of test equipment used on discrete protection scheme
- Techniques in the use of test equipment - electronic test equipment (Doble, Ohmicrome), gas injection equipment, manufactures test equipment, multimeters, phase angle meters, meggers.

T17 Voltage control techniques encompassing:

- Conditions leading to voltage collapse
- Effects on system of high and low voltage
- Voltage control devices - voltage regulators applied to generators and synchronous phase modifiers, electromagnetic voltage regulators, series and parallel capacitors, OLTC transformers and static VAR compensators (SVC's). SVC's includes saturated reactor compensators; thyristor controlled reactor compensators and

REQUIRED SKILLS AND KNOWLEDGE

combined systems

- Production of harmonics and methods of harmonic control
- Location of voltage control devices within the system

T18 Transient overvoltages encompassing:

- Causes and effects of transient overvoltages - switching transients and lightning transients, effects on plant items
- Control techniques and systems - surge diverters, shield wires and CB arc control
- Insulation systems - insulation systems, insulation coordination and insulation grading.

T19 Procedure to undertake a visual inspection of a scheme encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with visual inspection procedures of a scheme
- Requirements for the use of manuals, system diagrams/plans and drawings
- Identify obvious deficiencies in operating to the standard functionality
- Techniques in determining device malfunction
- Techniques in determining wiring defects.

T20 Commissioning procedures associated with relevant equipment encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures – planning, policy, testing techniques, close out requirements.

T21 Detailed operation and setting of discrete protection systems encompassing:

- Earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination, backup protection
- Overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination, backup protection
- Alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, over temperature schemes.

T22 Detailed operation of interdependent protection systems encompassing:

- Overcurrent and earth leakage schemes including intertripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic, shading

REQUIRED SKILLS AND KNOWLEDGE

coils

- Pilot wire, phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme, pilot supervisory techniques,
- Load shedding, voltage control, parallel operation, load rejection
- Busbar Protection and CB failure protection
- Reclose systems - applications, single shot, multishot, blocking schemes, synchronisation checking.

T23 Detailed operation of metering devices and principles encompassing:

- Common circuit configurations
- Meters and measurement principles
- Instrument transformer application
- Testing of metering systems and devices
- Implications of market operation.

T24 Detailed operation of fundamental test equipment encompassing:

- Care and safe use
- Operating principles
- Comparison of different operating principle meters used for the same purpose
- Accuracy and loading effects of meters - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence and the use of oscilloscopes.

T25 Detailed operation of protection test equipment encompassing:

- Care and safe use
- Operating principles
- Comparison of different operating principle meters used for the same purpose
- Accuracy and loading effects of meters - measurement of timing, voltage, current, resistance, inductance, capacitance, impedance, frequency, phase angle, phase difference and the use of primary, secondary and gas injection equipment.

T26 Detailed operation of metering test equipment encompassing:

- Care and safe use
- Operating principles
- Comparison of different operating principle meters used for the same purpose
- Accuracy and loading effects of meters - measurements of, voltage, current, power, reactive power, phase angle, resistance, inductance, capacitance, impedance, frequency, harmonics and the use of transient and data logging devices

T27 Detailed operation of field device test equipment encompassing:

- Care and safe use
- Operating principles
- Comparison of different operating principle meters used for the same purpose
- Accuracy and loading effects of meters - measurements of voltage, current, power,

REQUIRED SKILLS AND KNOWLEDGE

reactive power, phase angle, resistance, inductance, capacitance, impedance, frequency, harmonics and the use of transient and data logging devices.

T28 Procedure for the systematic fault isolation through the application of diagnostic techniques encompassing:

- Principles of analytical questioning
- Techniques in drawing valid conclusions from first observations
- Concepts of broad first-line testing
- Consideration of/responsibility for, avoidance of further damage
- Interpretation of specific test results: cause/effect
- Techniques for isolation to appropriate level - half-split, module/function isolation (kernel technique), substitution, diagnostic software, requirements for the use of manuals, system diagrams/plans, drawings, handbooks, specifications and fault pathways.
- Software/firmware functions awareness
- Factors affecting field versus workshop repair costs
- Scheduling minor/major repair activities, downtime
- Implications of temporary repairs
- Use of system knowledge and history
- Data interpretation, expected versus actual
- Feedback to design/production/installation processes
- Subsystems and system structures
- System signals/status indicators
- Known failure modes and trends
- Action threshold warnings versus catastrophic failure
- Component ratings/upgrades
- Disassembly/reassembly techniques and care
- Relative costs of repair and replacement - remaining life, ongoing maintenance, additional benefits of replacement equipment, e.g. improved productivity, quality.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Develop testing and commission procedures for at least three (3) of the following substation equipment:	Bus protection Feeder/line protection Transformer protection Earth fault protection Backup protection Metering schemes Communicate and SCADA schemes
B	Develop testing and commission procedures for any two of the following field devices:	Regulator ACR/gas switch Line capacitors
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual design of testing and commissioning procedures for substation and field devices.
- Operational access to relevant plant, protection equipment, scheme drawings and specialised testing equipment.

In addition to the resources listed above, in Context of and specific

resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the undertaking the design of testing and commissioning procedures for substation and field devices.

Tests may include: DC/AC measurements, error, continuity, noise level, return loss, spectrum analysis, radio on receiver sensibility, surveys - mobile phones/pager, end to end, line levels both in and out, transmitter power, transmitter frequency, transmitter deviation, receiver frequency and sensitivity, level and quality of demodulated output - audio/bit error rate, antenna sweep measurements, power and environmental conditions including emergency power plant.

Diagnostic, testing and restoration may involve: Appropriate documentation relating to the protection device; Voltage, current and resistance measuring instruments; Microprocessor based diagnostic test equipment; Laptop computer and diagnostic software; Loop control test instruments.

Complex testing refers to dielectric dissipation factors tests, partial discharge, applied and induced HV tests, CT and VT accuracy tests (calibration), watts loss, ratio confirmation tests, tests on interconnected equipment, sf6 tests.

Testing and recording equipment could include: Digital bearer test equipment; Voice frequency analysers; RF mounting equipment; RF spectrum equipment; Multimeters; Communication testers; Transmission measuring sets; Directional couplers; Laptop computers. Test and recording equipment may include: Infrascan equipment; Phasing equipment; Recording meters; Trend monitoring equipment; Condition monitoring equipment; Diagnostic testing devices using computer hardware and software; Taplon sticks; Insulation and continuity test instruments; Voltage, resistance and current testers; Ductors; Ratio meters; Earth systems testing devices; Capacitor bridge meters; Doble Test sets devices; High voltage alternating current test sets; Scope meters; Clip on ammeters; Test plans for automatic relay testing SCADA systems used for developing and evaluating voltage regulation systems, circuit breaker reclosing systems, VAR's monitoring and similar computer controlled diagnostic testing and recording.

Test and recording equipment may include: AC/DC test sets; IR testers; earth resistance meters; cable fault location equipment; circuit breaker timers; recording equipment; devices utilising computer hardware and software; oil dielectric strength equipment; trend monitoring equipment; infrared thermographic equipment; schering bridge; partial discharge test equipment; double insulation test set; primary injection test sets; CT and VT calibration equipment and sf6 leakage testers.

Computerised test equipment work may include, for example: Secondary injection test sets, primary test sets, insulation test sets, timing test sets, Circuit breaker test sets, magnetic test sets.

The following constants and variables included in the element/Performance Criteria in

RANGE STATEMENT

this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Testing Units

UETTDRTS25A Maintain and test and metering schemes

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the testing of metering schemes and includes isolation, inspection, monitoring, testing, adjustment, and repair, refurbishment and or overhaul and functional checks on schemes including ammeters, voltmeters, wattmeters, VAR meters and energy metering. It also includes the understanding of the purpose of the testing so as to prove accuracy and suitability of the metering for the required task.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

License to practice**3)**

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic

Prerequisite Unit(s)	4)	
		engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRTS29A	Develop power systems secondary isolation instructional documents

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the testing and maintenance of metering schemes	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the testing and maintenance of metering schemes, are reviewed and determined.
		1.2	Purpose of the testing and maintenance of metering schemes is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the testing and maintenance of metering schemes are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Testing parameters are established from organisational established procedures on policies and specifications.

ELEMENT	PERFORMANCE CRITERIA
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the testing and maintenance of metering schemes	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3 Testing and maintenance of metering schemes decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4 Mathematical/engineering models of the testing and maintenance of metering schemes are used to analyse the effectiveness of the finished project as per requirements and established procedures.
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be

ELEMENT**PERFORMANCE CRITERIA**

- undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing and maintenance of metering schemes is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
- 3 Complete the testing and maintenance of metering schemes
- 3.1 Final inspections of the testing and maintenance of metering schemes are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of the testing and maintenance of metering schemes documents are issues and

ELEMENT

PERFORMANCE CRITERIA

records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of testing and maintaining metering schemes.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS25A Metering schemes – testing and maintenance

Evidence shall show an understanding of metering schemes – testing and maintenance to an extent indicated by the following aspects:

T1 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T2 Procedure to undertake a visual inspection of a scheme encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with visual inspection procedures of a scheme
- Requirements for the use of manuals, system diagrams/plans and drawings
- Identify obvious deficiencies in operating to the standard functionality
- Techniques in determining device malfunction
- Techniques in determining wiring defects.

T3 Procedures for the location and rectification of faults in electrical equipment up to 1000 volts AC and or 1500 volts DC, encompassing:

- Relationship of Occupational Health and Safety to the location and rectification of faults in electrical equipment - Act and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency First Aid/resuscitation, rescue from a live electrical situation, enterprise policies and procedures.
- Types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment, fault-finding techniques and procedures
- Fundamental electrical concepts - effects of current, practical resistors, sources of EMF, series, parallel and series-parallel circuits, electrical measurement, capacitors, inductors, magnetism.
- Fundamentals of general appliances - basic principles of appliances (non mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and

REQUIRED SKILLS AND KNOWLEDGE

symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in appliances, fault-finding procedures (prescriptive)

- Fundamentals of single phase induction motors - basic principles of operation (non mathematical), motor identification, motor ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedure, including continuity, fault types in “phase splitting” and universal type motors, fault-finding procedures (prescriptive).
- Fundamentals of three phase induction motors - basic principles of operation (non mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedure, fault-finding procedures (prescriptive)
- Fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedure, fault-finding procedures (prescriptive).

T4 Detailed operation of metering devices and principles encompassing:

- Common circuit configurations
- Meters and measurement principles
- Instrument transformer application
- Testing of metering systems and devices
- Implications of market operation.

T5 Detailed operation of metering test equipment encompassing:

- Care and safe use
- Operating principles
- Comparison of different operating principle meters used for the same purpose
- Accuracy and loading effects of meters - measurements of, voltage, current, power, reactive power, phase angle, resistance, inductance, capacitance, impedance, frequency, harmonics and the use of transient and data logging devices

T6 Disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts AC and or 1500 volts DC, encompassing:

- Safe electrical work practices and procedures according to standards such as AS/NZ 4836:2001 or equivalent
- Safe use of tools and plant
- Safe use of ladders and elevated work platforms
- Safe use of protective clothing
- Hazards in the (electrical) work environment - shock hazards, fire hazards, chemical hazards, other hazardous areas

REQUIRED SKILLS AND KNOWLEDGE

- Special situations
- Procedures for dealing with fires associated with electrical equipment
- Procedures for dealing with PCBs
- Electric shock victim rescue methods and procedures - basic First Aid treatment for shock, burns and bleeding.
- Purpose of each procedure and application - expired air resuscitation (EAR), external cardiac-compression (ECC), cardio-pulmonary resuscitation (CPR), combined application of EAR and ECC (purpose of each procedure and application).
- Components of a basic electrical circuit(s) – source, control, protection, load
- Types of circuit diagrams – symbols, conventions, interpretations, free sketches
- Types of circuit connections and functions - open circuit, closed circuit, short circuit
- Techniques in basic electrical measurement - use of multimeters; use of ammeter; use of voltage measuring and indicating devices; testing of measuring instruments; care of measuring instruments; voltage, current and resistance measurement; estimating values of voltage, current and resistance; using ohms law
- Fundamental principles of electrical concepts - effects of current; practical resistors; sources of EMF; simple practical circuit; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors; magnetism
- Techniques in insulation resistance measurement and requirements
- Earthing principles and systems.

T7 Disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts AC and or 1500 volts DC, encompassing:

- Methods for testing insulation resistance - continuity of prospective earthing conductor, continuity between exposed conductive parts and the earthing system
- Methods of recognising acceptable test results for compliance with safety requirements
- Methods of recognising unacceptable test results and require an appropriate qualified person to further investigation
- Cable types and conductor termination methods and techniques - conductors solid, stranded and flexible, colour codes
- Single and three phase systems and loads - number of active and live conductors required, line and phase voltage, typical loads
- Identification and rating of general appliances
- Single phase induction motors - motor identification, motor ratings, direction of rotation
- Three phase induction motors - motor identification, motor ratings, direction of rotation
- Single and three phase heaters - types of heaters, heater identification, heater ratings
- Electrical distribution arrangement - power systems within premises, purpose of

REQUIRED SKILLS AND KNOWLEDGE

switchboards/distribution boards (residual current devices and ELCBs)

- Circuit isolation and protection devices
- Isolation procedures - work clearance, testing for voltage, lock-off and tagging, techniques in isolation and tagging, regulation, codes of practice and procedures
- Disconnection procedures, practices and requirements
- Types of replacement equipment
- Methods of ensuring equipment is safe to connect to supply
- Methods of reconnection procedures, practices and requirements
- Methods of return equipment to service

T8 Effects of harmonics encompassing:

- Characteristics and effects of harmonics on protection device functions/malfunction
- Effects of harmonics on transformers, generators, motors, quality of supply.

T9 Procedure for the systematic fault isolation through the application of diagnostic techniques encompassing:

- Principles of analytical questioning
- Techniques in drawing valid conclusions from first observations
- Concepts of broad first-line testing
- Consideration of/responsibility for, avoidance of further damage
- Interpretation of specific test results: cause/effect
- Techniques for isolation to appropriate level - half-split, module/function isolation (kernel technique), substitution, diagnostic software, requirements for the use of manuals, system diagrams/plans, drawings, handbooks, specifications and fault pathways.
- Software/firmware functions awareness
- Factors affecting field versus workshop repair costs
- Scheduling minor/major repair activities, downtime
- Implications of temporary repairs
- Use of system knowledge and history
- Data interpretation, expected versus actual
- Feedback to design/production/installation processes
- Subsystems and system structures
- System signals/status indicators
- Known failure modes and trends
- Action threshold warnings versus catastrophic failure
- Component ratings/upgrades
- Disassembly/reassembly techniques and care
- Relative costs of repair and replacement - remaining life, ongoing maintenance, additional benefits of replacement equipment, e.g. improved productivity, quality.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Demonstrate, on at least three (3) occasions, testing accuracy to established plans of at least three (3) schemes using the following equipment:	Ammeter Voltmeter Wattmeter VAR meter Energy meter* (*Must do)
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual testing and maintenance of metering schemes.
- Operational access to relevant plant, protection equipment, scheme drawings and specialised testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

**Method of
assessment** **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the testing and maintenance of metering schemes may include the following:

Isolation, functional checks, inspection, monitoring, testing, adjustment, and repair, refurbishment and or overhaul procedures on schemes including ammeters, voltmeters, wattmeters, VAR meters and energy metering.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Testing Units

UETTDRTS26A Commission power systems metering schemes

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the commissioning of metering schemes and includes, isolation, inspection, monitoring, testing, adjustment, and repair, refurbishment and or overhaul and function checks on schemes including ammeters, voltmeters, wattmeters, VAR meters and energy metering. It also includes an emphasis on ensuring that the metering is connected into the power system safely and correctly and that it returns valid information.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice**3)**

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems

Prerequisite Unit(s)	4)	
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRTS25A	Maintain and test and metering schemes
	UETTDRTS29A	Develop power systems secondary isolation instructional documents

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the commissioning of metering schemes	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of metering schemes, are reviewed and determined.
		1.2	Purpose of the commissioning of metering schemes is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the commissioning of metering schemes are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Testing parameters are established from organisational established procedures on policies and specifications.

ELEMENT	PERFORMANCE CRITERIA
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the commissioning of metering schemes	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3 Commissioning of metering schemes decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4 Mathematical/engineering models of the commissioning of metering schemes are used to analyse the effectiveness of the finished project as per requirements and established procedures.
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be

ELEMENT**PERFORMANCE CRITERIA**

- undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing of the commissioning of metering schemes is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
- 3 Complete the commissioning of metering schemes
- 3.1 Final inspections of the commissioning of metering schemes are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of the commissioning of metering schemes documents are issues and

ELEMENT**PERFORMANCE CRITERIA**

records are updated in accordance with established procedures.

Required Skills and Knowledge**REQUIRED SKILLS AND KNOWLEDGE**

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of commissioning metering schemes.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS26A Power systems metering schemes – commissioning

Evidence shall show an understanding of power systems metering schemes – commissioning to an extent indicated by the following aspects:

T1 Installation of metering and control equipment encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
- Types of meters - kilowatt-hour meters single and polyphase, demand meters, recording meters and electronic recording metering systems summators
- Installation and removal methods - direct connection and plug in method, enterprise specific
- Types of associated equipment and accessories - meter boards, service fuse, links, contactors, time switch, audio frequency injection relay
- Testing procedures - safety testing, polarity testing

T2 Commissioning procedures associated with relevant equipment encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures – planning, policy, testing techniques, close out requirements.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Demonstrate commissioning metering schemes on at least three (3) occasions, testing accuracy to established plans of at least three (3) schemes using the following equipment.	Ammeter Voltmeter Wattmeter VAR meter Energy meter* (*Must do)
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual commissioning of metering schemes.
- Operational access to relevant plant, protection or metering equipment, scheme drawings, manufacture's specifications/manuals and testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

**Method of
assessment****9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units****9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the commissioning of metering schemes and may include the following: isolation, inspection, monitoring, testing, adjustment, and repair, refurbishment and or overhaul and function checks on schemes including ammeters, voltmeters, wattmeters, VAR meters and energy metering.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification

RANGE STATEMENT

- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Testing Units

UETTDRTS27A Perform accuracy checks on power systems instrument transformers

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the task of undertaking accuracy checks on instrument transformers and includes proving their functionality. It also includes both current and voltage instrument transformers having various operating principles, which are designed for metering, protection, monitoring or control usage. It also encompasses tasks associated with the isolation from other secondary circuits, inspection, measurement of excitation curves, measurement of phase and ratio errors and comparison of results with previous historical results and/or published specifications.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice

3)

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for

Prerequisite Unit(s)	4)	problems in complex multiple path circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRL62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRL63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for accuracy checks on instrument transformers	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the performance of accuracy checks on instrument transformers, are reviewed and determined.
		1.2	Purpose of the performance of accuracy checks on instrument transformers is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the performance of accuracy checks on instrument transformers are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.

ELEMENT	PERFORMANCE CRITERIA	
1.5	Testing parameters are established from organisational established procedures on policies and specifications.	
1.6	Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.	
1.7	Work roles and tasks are allocated according to requirements and individuals' competencies.	
1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.	
1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.	
1.10	Risk control measures are identified, prioritised and evaluated against the work schedule.	
1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.	
2 Carry out accuracy checks on instrument transformers	2.1	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2	OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3	Performance of accuracy checks on instrument transformer decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4	Mathematical and/or engineering models of the performance of accuracy checks on instrument transformers are used to analyse the

ELEMENT

PERFORMANCE CRITERIA

- effectiveness of the finished project as per requirements and established procedures.
- 2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Accuracy checks on instrument transformers are undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
- 3 Complete the performance of accuracy checks on instrument transformers
- 3.1 Final review of test results on instrument transformers are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.

ELEMENT

PERFORMANCE CRITERIA

- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of the performance of accuracy checks on instrument transformers documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of performing accuracy checks on instrument transformers.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS27A Power systems instrument transformers - accuracy checks

Evidence shall show an understanding of power systems instrument transformers - accuracy checks to an extent indicated by the following aspects:

T1 OHS enterprise responsibilities encompassing:

- Provisions of relevant health and safety legislation
- Principles and practice of effective occupational health and safety management
- Management arrangements relating to regulatory compliance
- Enterprise hazards and risks, control measures and relevant expertise required
- Characteristics and composition of workforce and their impact on occupational health and safety management
- Relevance of enterprise management systems to occupational health and safety management
- Analysis of working environment and design of appropriate occupational health and safety management systems
- Analysis of relevant data and evaluation of occupational health and safety system effectiveness
- Assess resources to establish and maintain occupational health and safety management systems.

T2 Generation systems encompassing:

- Methods of generating electricity - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
- Relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
- The purpose and features of typical types of co-generation systems.

T3 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders

REQUIRED SKILLS AND KNOWLEDGE

- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T4 Substations, power transformers and reactors encompassing:

- Relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
- Characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling
- Auxiliary equipment used on transformers - function and basic operation of equipment
- Maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault finding procedures
- Description, purpose and characteristics of a reactors

T5 Co-ordinating access authority procedures encompassing:

- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and co-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
- Techniques in facilitating and co-ordinating the delivery and issuing of access authorities
- Techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific work site, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, regulatory requirements such as Occupational Health and Safety and electrical safety
- Techniques in the receiving and co-ordinating the cancellation of access authorities in readiness for restoration
- Methods of conducting audits on correct access authority procedures
- Process of issuing of other access authorities for work permits - working in confined space, if required, co-ordination of access authorities, engaging and

REQUIRED SKILLS AND KNOWLEDGE

briefing contractors on electrical and other work

- Issue and receipt of operating agreements.

T6 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T7 HV system switching principles including switching authorisation procedures to an extent indicated by the following aspects:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of HV systems and equipment to be switched
- Procedures for obtaining correct HV switching authorisation - identification of OHS hazards, assessing and controlling risks, Safety procedures and precautions, safe approach distances
- responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, Requirements for team switching, procedures for coordination of operations.
- Techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures, energisation procedures

T8 LV system switching principles including switching authorisation procedures encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of LV systems and equipment to be switched
- Procedures for obtaining correct LV switching authorization - identification of OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching, procedures for coordination of operations.
- Techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures, energisation procedures.

T9 Detailed operation of instrument transformers encompassing:

- Voltage and current transformer principles and terminology

REQUIRED SKILLS AND KNOWLEDGE

- Types and classes of current transformers
- Constructions of current transformers
- Characteristics of current transformers
- Testing of current transformers
- Types and categories of voltage transformers
- Constructions of voltage transformers
- Characteristics of voltage transformers
- Testing of voltage transformers

T10 Protection schemes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to protection schemes
- Types of protection schemes - reasons for use, application of protection zones around system elements, degree of protection
- Types of feeder protection equipment - over current protection inverse time-current operating characteristics
- Operation of over current protection equipment used on distribution systems
- Operation of ACRs and their time-current characteristics
- Types and characteristics of over-current relays
- Coordination methods of a distribution feeder protection scheme
- Earth fault protection used on a distribution feeder
- Operation of a single wire earth return (S.W.E.R) system

T11 EHV generator control systems encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the operation of a portable generator
- Safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, synchronising procedures
- Techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load, assessing the appropriateness of the generator
- Operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations, kiosk substations
- EHV generator set and control system to EHV Distribution assets.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Perform five (5) accuracy checks on instrument transformers and incorporate all of the following:	Isolation from other secondary circuits Inspection Measurement of excitation curves
B	Measure phase and ratio errors on all of the following:	Current transformers Voltage transformers
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual performance of accuracy checks on instrument transformers.
- Operational access to relevant plant, protection or metering equipment, scheme drawings, manufacture’s specifications/manuals and testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the task of undertaking accuracy checks on instrument transformers and includes proving their functionality and, shall be demonstrated using the following: current instrument transformers, voltage instrument transformers

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Testing Units

UETTDRTS28A Repair, test and calibrate protection relays and meters

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the repair, calibration and testing of various types of protection relays. These can include electromechanical, analogue, digital electronic and numerical devices. It also involves the finding and replacing faulty components, testing to manufacturers or users specifications and proving all functions of the devices under test.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

License to practice**3)**

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic

Prerequisite Unit(s)	4)	engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the

Employability Skills

5)

qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Plan for the testing, repair and calibration of protection relays and meters	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the testing, repair and calibration of protection relays and meters, are reviewed and determined.
		1.2	Purpose of the testing, repair and calibration of protection relays and meters is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the testing, repair and calibration of protection relays and meters are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Testing parameters are established from organisational established procedures on policies and specifications.
		1.6	Equipment/tools and personal protective equipment are selected based on specified

ELEMENT	PERFORMANCE CRITERIA
	Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the testing, repair and calibration of protection relays and meters	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3 Testing, repair and calibration decisions of protection relays and meters are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4 Mathematical and/or engineering models of the testing, repair and calibration of protection relays and meters are used to analyse the effectiveness of the finished project as per requirements and established procedures.
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities

ELEMENT**PERFORMANCE CRITERIA**

		consulted, where necessary, in accordance with requirements and established procedures.
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
	2.7	Testing, repair and calibration of protection relays and meters is undertaken according to requirements and established procedures.
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
	2.11	Strategic plans are developed incorporating organisation initiatives as per established procedures.
3	Complete the testing, repair and calibration of protection relays and meters	3.1 Final review of test results of tested, repaired and calibrated protection relays and meters are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
		3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
		3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
		3.4 Approved copies of the testing, repair and calibration of protection relays and meters

ELEMENT

PERFORMANCE CRITERIA

documents are issues and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of testing, repairing and calibrating protection relays and meters.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS28A Power systems protection relays and meters

Evidence shall show an understanding of power systems protection relays and meters to an extent indicated by the following aspects:

T1 Procedures for the location and rectification of faults in electrical equipment up to 1000 volts AC and or 1500 volts DC, encompassing:

- Relationship of Occupational Health and Safety to the location and rectification of faults in electrical equipment - Act and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency First Aid/resuscitation, rescue from a live electrical situation, enterprise policies and procedures.
- Types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment, fault-finding techniques and procedures
- Fundamental electrical concepts - effects of current, practical resistors, sources of EMF, series, parallel and series-parallel circuits, electrical measurement, capacitors, inductors, magnetism.
- Fundamentals of general appliances - basic principles of appliances (non mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in appliances, fault-finding procedures (prescriptive)
- Fundamentals of single phase induction motors - basic principles of operation (non mathematical), motor identification, motor ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedure, including continuity, fault types in “phase splitting” and universal type motors, fault-finding procedures (prescriptive).
- Fundamentals of three phase induction motors - basic principles of operation (non mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedure, fault-finding procedures (prescriptive)
- Fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault

REQUIRED SKILLS AND KNOWLEDGE

conditions and symptoms, safe testing procedure, fault-finding procedures (prescriptive).

T2 Detailed operation of metering devices and principles encompassing:

- Common circuit configurations
- Meters and measurement principles
- Instrument transformer application
- Testing of metering systems and devices
- Implications of market operation.

T3 Detailed operation of fundamental test equipment encompassing:

- Care and safe use
- Operating principles
- Comparison of different operating principle meters used for the same purpose
- Accuracy and loading effects of meters - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence and the use of oscilloscopes.

T4 Detailed operation of protection test equipment encompassing:

- Care and safe use
- Operating principles
- Comparison of different operating principle meters used for the same purpose
- Accuracy and loading effects of meters - measurement of timing, voltage, current, resistance, inductance, capacitance, impedance, frequency, phase angle, phase difference and the use of primary, secondary and gas injection equipment.

T5 Protection schemes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to protection schemes
- Types of protection schemes - reasons for use, application of protection zones around system elements, degree of protection
- Types of feeder protection equipment - over current protection inverse time-current operating characteristics
- Operation of over current protection equipment used on distribution systems
- Operation of ACRs and their time-current characteristics
- Types and characteristics of over-current relays
- Coordination methods of a distribution feeder protection scheme
- Earth fault protection used on a distribution feeder
- Operation of a single wire earth return (S.W.E.R) system.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	All of the following simple protection schemes:	Auxiliary Overcurrent Timers Voltage
B	At least three (3) of the following intermediate protection devices:	Inverse time delay overcurrent Voltage regulating relays Differential Pilot wire
C	At least two (2) of the following advanced protection schemes:	Multi zone impedance Multi function feeder protection Phase comparison Digital current differential
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual testing, repair and calibration of protection

relays and meters.

- Operational access to relevant plant, protection and or metering equipment, scheme drawings, manufacture's specifications/manuals and testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the testing, repair and calibration of protection relays and meters and may include the following:

Frame leakage relays; distance relays; pilot wire relays; transformer differential relays; busbar differential relays; impedance bus zone relays; overcurrent and earth fault relays; transformer neutral check relays; circuit breaker fail relays; multi-trip relays; auto recloser relays; voltage transformer failure relays; surge protection relays; buchholz relays; winding temperature relays; sensitive earth fault relays; phase failure relays; frequency relays; load shedding relays.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Testing Units

UETTDRTS29A Develop power systems secondary isolation instructional documents

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the skills needed to develop secondary isolations. This will involve analysis of tripping and a thorough understanding of secondary voltage and current, DC, alarm, metering and communication circuits. It also involves accurate communication of this information in a format acceptable to the Operating or Testing authority.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

License to practice

3)

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic

Prerequisite Unit(s)	4)	
		engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the

Employability Skills

5)

qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the development of secondary isolation instructional documents	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the development of secondary isolation instructional documents, are reviewed and determined.
		1.2	Purpose of the development of secondary isolation instructional documents is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the development of secondary isolation instructional documents are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Testing parameters are established from organisational established procedures on policies and specifications.
		1.6	Equipment/tools and personal protective equipment are selected based on specified

ELEMENT	PERFORMANCE CRITERIA
	Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the development of secondary isolation instructional documents	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3 Development of secondary isolation instructional documents decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4 Mathematical and/or engineering models of the development of secondary isolation instructional documents are used to analyse the effectiveness of the finished project as per requirements and established procedures.
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with

ELEMENT

PERFORMANCE CRITERIA

- requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing of the development of secondary isolation instructional documents is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
- 3 Complete the development of secondary isolation instructional documents
- 3.1 Final inspections of the development of secondary isolation instructional documents are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of the development of secondary isolation instructional documents are issued and records are updated in accordance

ELEMENT

PERFORMANCE CRITERIA

with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of developing secondary isolation instructional documents.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS29A Power systems secondary isolation instructional documents

Evidence shall show an understanding of power systems secondary isolation instructional documents to an extent indicated by the following aspects:

T1 OHS enterprise responsibilities encompassing:

- Provisions of relevant health and safety legislation
- Principles and practice of effective occupational health and safety management
- Management arrangements relating to regulatory compliance
- Enterprise hazards and risks, control measures and relevant expertise required
- Characteristics and composition of workforce and their impact on occupational health and safety management
- Relevance of enterprise management systems to occupational health and safety management
- Analysis of working environment and design of appropriate occupational health and safety management systems
- Analysis of relevant data and evaluation of occupational health and safety system effectiveness
- Assess resources to establish and maintain occupational health and safety management systems.

T2 Generation systems encompassing:

- Methods of generating electricity - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
- Relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
- The purpose and features of typical types of co-generation systems.

T3 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders

REQUIRED SKILLS AND KNOWLEDGE

- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T4 Substations, power transformers and reactors encompassing:

- Relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
- Characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling
- Auxiliary equipment used on transformers - function and basic operation of equipment
- Maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault finding procedures
- Description, purpose and characteristics of a reactors

T5 HV generator control systems encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the operation of a portable generator.
- Safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, synchronising procedures
- Techniques in the installation of generator sets control systems - synchronising of generator control systems onto and off the network without interruption to supply, estimation of HV load, assessing the appropriateness of the generator.
- Operating a generator in parallel to a single HV job - overhead systems, indoor systems, customer installations, kiosk substations.
- HV generator set and control system to HV Distribution assets

T6 Electrical equipment fundamentals used in the powerline industry encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment (HV and LV equipment)
- Characteristics, capabilities and application of powerline electrical equipment
- Safety precautions with regards to using electrical equipment
- Techniques in pre-use inspection on the serviceability of electrical equipment
- Techniques in the general maintenance, and care and storage of electrical equipment
- Identifying hazards, assessing and controlling risks associated with their the use of electrical equipment

REQUIRED SKILLS AND KNOWLEDGE

T7 Co-ordinating access authority procedures encompassing:

- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and co-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
- Techniques in facilitating and co-ordinating the delivery and issuing of access authorities
- Techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific work site, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, regulatory requirements such as Occupational Health and Safety and electrical safety
- Techniques in the receiving and co-ordinating the cancellation of access authorities in readiness for restoration
- Methods of conducting audits on correct access authority procedures
- Process of issuing of other access authorities for work permits - working in confined space, if required, co-ordination of access authorities, engaging and briefing contractors on electrical and other work
- Issue and receipt of operating agreements.

T8 HV system switching principles including switching authorisation procedures to an extent indicated by the following aspects:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of HV systems and equipment to be switched
- Procedures for obtaining correct HV switching authorisation - identification of OHS hazards, assessing and controlling risks, Safety procedures and precautions, safe approach distances
- responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, Requirements for team switching, procedures for coordination of operations.
- Techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures, energisation procedures

T9 LV system switching principles including switching authorisation procedures

REQUIRED SKILLS AND KNOWLEDGE

encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of LV systems and equipment to be switched
- Procedures for obtaining correct LV switching authorization - identification of OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching, procedures for coordination of operations.
- Techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures, energisation procedures.

T10 Secondary switching/isolation principles and sheet preparation encompassing:

- Techniques in performing and demonstrating correct sequence of isolation and/or restoration - communications with appropriate authorities, ensuring adequate protection remains in service to provide plant protection, reading and interpreting drawings for switching /isolating, sheet/instruction preparation.

T11 Protection schemes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to protection schemes
- Types of protection schemes - reasons for use, application of protection zones around system elements, degree of protection
- Types of feeder protection equipment - over current protection inverse time-current operating characteristics
- Operation of over current protection equipment used on distribution systems
- Operation of ACRs and their time-current characteristics
- Types and characteristics of over-current relays
- Coordination methods of a distribution feeder protection scheme
- Earth fault protection used on a distribution feeder
- Operation of a single wire earth return (S.W.E.R) system

T12 EHV generator control systems encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the operation of a portable generator
- Safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, synchronising procedures
- Techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load, assessing the appropriateness of the generator
- Operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations, kiosk substations

REQUIRED SKILLS AND KNOWLEDGE

- EHV generator set and control system to EHV Distribution assets.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to

safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Develop secondary isolation instructional documents for four (4) of the following substation equipment:	Bus protection High impedance bus protection Feeder/line protection Transformer protection Earth fault protection Backup protection Pilot wire protection
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual development of secondary isolation instructional documents.
- Operational access to relevant plant, protection or metering equipment, scheme drawings, manufacture’s

specifications/manuals and testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the development of secondary isolation instructional documents.

Tests may include: DC/AC measurements, error, continuity, noise level, return loss, spectrum analysis, radio on receiver sensibility, surveys - mobile phones/pager, end to end, line levels both in and out, transmitter power, transmitter frequency, transmitter deviation, receiver frequency and sensitivity, level and quality of demodulated output - audio/bit error rate, antenna sweep measurements, power and environmental conditions including emergency power plant.

Diagnostic, testing and restoration may involve: Appropriate documentation relating to the protection device; Voltage, current and resistance measuring instruments; Microprocessor based diagnostic test equipment; Laptop computer and diagnostic software; Loop control test instruments.

Complex testing refers to dielectric dissipation factors tests, partial discharge, applied and induced HV tests, CT and VT accuracy tests (calibration), watts loss, ratio confirmation tests, tests on interconnected equipment, sf6 tests.

Testing and recording equipment could include: Digital bearer test equipment; Voice frequency analysers; RF mounting equipment; RF spectrum equipment; Multimeters; Communication testers; Transmission measuring sets; Directional couplers; Laptop computers.

Test and recording equipment may include: Infrascan equipment; Phasing equipment; Recording meters; Trend monitoring equipment; Condition monitoring equipment; Diagnostic testing devices using computer hardware and software; Taplon sticks; Insulation and continuity test instruments; Voltage, resistance and current testers; Ductors; Ratio meters; Earth systems testing devices; Capacitor bridge meters; Doble Test sets devices; High voltage alternating current test sets; Scope meters; Clip on ammeters; Test plans for automatic relay testing SCADA systems used for developing and evaluating voltage regulation systems, circuit breaker reclosing systems, VAR's monitoring and similar computer controlled diagnostic testing and recording.

Test and recording equipment may include: AC/DC test sets; IR testers; earth resistance meters; cable fault location equipment; circuit breaker timers; recording equipment; devices utilising computer hardware and software; oil dielectric strength equipment; trend monitoring equipment; infrared thermographic equipment; schering bridge; partial discharge test equipment; double insulation test set; primary injection test sets; CT and VT calibration equipment and sf6 leakage testers.

Computerised test equipment work may include, for example: Secondary injection test sets, primary test sets, insulation test sets, timing test sets, Circuit breaker test sets, magnetic test sets.

RANGE STATEMENT

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
Testing Units

UETTDRTS30A Design power systems secondary isolation instructional documents

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the skills needed to design secondary isolations. This will involve analysis of tripping and a thorough understanding of secondary voltage and current, DC, alarm, metering and communication circuits. It also involves accurate communication of this information in a format acceptable to the Operating or Testing authority.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 6 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

License to practice

3)

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic

Prerequisite Unit(s)	4)	
		engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the

Employability Skills

5)

qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the design of secondary isolation instructional documents	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the design of secondary isolation instructional documents, are reviewed and determined.
		1.2	Purpose of the design of secondary isolation instructional documents is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the design of secondary isolation instructional documents are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Testing parameters are established from organisational established procedures on policies and specifications.
		1.6	Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.

ELEMENT

PERFORMANCE CRITERIA

- 1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
- 1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
- 1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 2 Carry out the design of secondary isolation instructional documents
 - 2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
 - 2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
 - 2.3 Design of secondary isolation instructional documents decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
 - 2.4 Mathematical and/or engineering models of the design of secondary isolation instructional documents are used to analyse the effectiveness of the finished project as per requirements and established procedures.
 - 2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.

ELEMENT

PERFORMANCE CRITERIA

- | | |
|------|---|
| 2.6 | Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements. |
| 2.7 | Testing of the design of secondary isolation instructional documents is undertaken according to requirements and established procedures. |
| 2.8 | Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures. |
| 2.9 | Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements. |
| 2.10 | Quality of work is monitored against personal performance agreement and/or established organisational and professional standards. |
| 2.11 | Strategic plans are developed incorporating organisation initiatives as per established procedures. |
| 3 | Complete the design of secondary isolation instructional documents |
| 3.1 | Final inspections of the design of secondary isolation instructional documents are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project. |
| 3.2 | Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned. |
| 3.3 | Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval. |
| 3.4 | Approved copies of the design of secondary isolation instructional documents are issued and records are updated in accordance with established procedures. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of designing secondary isolation instructional documents.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS30A Power systems secondary isolation instructional documents - design

Evidence shall show an understanding of power systems secondary isolation instructional documents - design to an extent indicated by the following aspects:

T1 OHS enterprise responsibilities encompassing:

- Provisions of relevant health and safety legislation
- Principles and practice of effective occupational health and safety management
- Management arrangements relating to regulatory compliance
- Enterprise hazards and risks, control measures and relevant expertise required
- Characteristics and composition of workforce and their impact on occupational health and safety management
- Relevance of enterprise management systems to occupational health and safety management
- Analysis of working environment and design of appropriate occupational health and safety management systems
- Analysis of relevant data and evaluation of occupational health and safety system effectiveness
- Assess resources to establish and maintain occupational health and safety management systems.

T2 Secondary switching/isolation principles and sheet preparation encompassing:

- Techniques in performing and demonstrating correct sequence of isolation and/or restoration - communications with appropriate authorities, ensuring adequate protection remains in service to provide plant protection, reading and interpreting drawings for switching /isolating, sheet/instruction preparation.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Design secondary isolation instructional documents for four (4) of the following substation equipment:	Bus protection High impedance bus protection Feeder/line protection Transformer protection Earth fault protection Backup protection Pilot wire protection
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual design of secondary isolation instructional documents
- Operational access to relevant plant, protection or metering equipment, scheme drawings, manufacture’s specifications/manuals and testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the design of secondary isolation instructional documents.

Tests may include: DC/AC measurements, error, continuity, noise level, return loss, spectrum analysis, radio on receiver sensibility, surveys - mobile phones/pager, end to end, line levels both in and out, transmitter power, transmitter frequency, transmitter deviation, receiver frequency and sensitivity, level and quality of demodulated output - audio/bit error rate, antenna sweep measurements, power and environmental conditions including emergency power plant.

Diagnostic, testing and restoration may involve: Appropriate documentation relating to the protection device; Voltage, current and resistance measuring instruments; Microprocessor based diagnostic test equipment; Laptop computer and diagnostic software; Loop control test instruments.

Complex testing refers to dielectric dissipation factors tests, partial discharge, applied and induced HV tests, CT and VT accuracy tests (calibration), watts loss, ratio confirmation tests, tests on interconnected equipment, sf6 tests.

Testing and recording equipment could include: Digital bearer test equipment; Voice frequency analysers; RF mounting equipment; RF spectrum equipment; Multimeters; Communication testers; Transmission measuring sets; Directional couplers; Laptop computers.

Test and recording equipment may include: Infrascan equipment; Phasing equipment; Recording meters; Trend monitoring equipment; Condition monitoring equipment; Diagnostic testing devices using computer hardware and software; Taplon sticks; Insulation and continuity test instruments; Voltage, resistance and current testers; Ductors; Ratio meters; Earth systems testing devices; Capacitor bridge meters; Doble Test sets devices; High voltage alternating current test sets; Scope meters; Clip on ammeters; Test plans for automatic relay testing SCADA systems used for developing and evaluating voltage regulation systems, circuit breaker reclosing systems, VAR's monitoring and similar computer controlled diagnostic testing and recording.

Test and recording equipment may include: AC/DC test sets; IR testers; earth resistance meters; cable fault location equipment; circuit breaker timers; recording equipment; devices utilising computer hardware and software; oil dielectric strength equipment; trend monitoring equipment; infrared thermographic equipment; schering bridge; partial discharge test equipment; double insulation test set; primary injection test sets; CT and VT calibration equipment and sf6 leakage testers.

Computerised test equipment work may include, for example: Secondary injection test sets, primary test sets, insulation test sets, timing test sets, Circuit breaker test sets, magnetic test sets.

RANGE STATEMENT

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Testing Units

UETTDRTS31A Maintain, test and commission power systems voltage regulating equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance, testing and commissioning of Distribution field devices to relevant standards, including voltage regulators, automatic circuit reclosers control boxes, line capacitors, and associated communication devices. It includes communicating with the Operating Authority, testing, clearing after test and energisation using techniques that are acceptable to the Operating Authority

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental

License to practice

3)

protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems

Prerequisite Unit(s)	4)	
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of

Employability Skills

5)

competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Plan and coordinate the maintenance, testing and commissioning of Distribution field devices	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the maintenance testing and commissioning of distribution field devices, are reviewed and determined.
	1.2 Purpose of the work is established and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Established organisational procedures, policies and specifications for the work are obtained or established with the appropriate personnel.
	1.4 Equipment/tools and personal protective equipment are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|---|--|
| | 1.6 | Risk control measures are identified, prioritised and evaluated against the work schedule. |
| | 1.7 | Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures. |
| | 1.8 | Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order. |
| | 1.9 | Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work. |
| | 1.10 | Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures. |
| 2 | Carry out and coordinate the maintenance, testing and commissioning of Distribution field devices | |
| | 2.1 | Circuit/systems modelling is used to evaluate alternative proposals as per established procedures. |
| | 2.2 | OHS and sustainable energy principles, functionality and practices to avoid the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures. |
| | 2.3 | Maintenance, testing and commissioning decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures. |
| | 2.4 | Mathematical models of the distribution system are used to analyse the effectiveness of the finished project as per requirements and established procedures. |
| | 2.5 | Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities |

ELEMENT

PERFORMANCE CRITERIA

- consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.
- 2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 3 Complete and coordinate the maintenance, testing and commissioning of Distribution field devices
- 3.1 Final inspections of the work are undertaken to ensure it complies with all requirements and includes all specifications and documentation needed to complete the brief.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of test documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining, testing and commissioning voltage regulating equipment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS31A Power systems voltage regulating equipment

Evidence shall show an understanding of power systems voltage regulating equipment to an extent indicated by the following aspects:

T1 OHS enterprise responsibilities encompassing:

- Provisions of relevant health and safety legislation
- Principles and practice of effective occupational health and safety management
- Management arrangements relating to regulatory compliance
- Enterprise hazards and risks, control measures and relevant expertise required
- Characteristics and composition of workforce and their impact on occupational health and safety management
- Relevance of enterprise management systems to occupational health and safety management
- Analysis of working environment and design of appropriate occupational health and safety management systems
- Analysis of relevant data and evaluation of occupational health and safety system effectiveness
- Assess resources to establish and maintain occupational health and safety management systems.

T2 Generation systems encompassing:

- Methods of generating electricity - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
- Relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
- The purpose and features of typical types of co-generation systems.

T3 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders

REQUIRED SKILLS AND KNOWLEDGE

- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T4 Substations, power transformers and reactors encompassing:

- Relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
- Characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling
- Auxiliary equipment used on transformers - function and basic operation of equipment
- Maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault finding procedures
- Description, purpose and characteristics of a reactors

T5 Co-ordinating access authority procedures encompassing:

- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and co-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
- Techniques in facilitating and co-ordinating the delivery and issuing of access authorities
- Techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific work site, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, regulatory requirements such as Occupational Health and Safety and electrical safety
- Techniques in the receiving and co-ordinating the cancellation of access authorities in readiness for restoration
- Methods of conducting audits on correct access authority procedures
- Process of issuing of other access authorities for work permits - working in confined space, if required, co-ordination of access authorities, engaging and

REQUIRED SKILLS AND KNOWLEDGE

briefing contractors on electrical and other work

- Issue and receipt of operating agreements.

T6 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T7 HV system switching principles including switching authorisation procedures to an extent indicated by the following aspects:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of HV systems and equipment to be switched
- Procedures for obtaining correct HV switching authorisation - identification of OHS hazards, assessing and controlling risks, Safety procedures and precautions, safe approach distances
- responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, Requirements for team switching, procedures for coordination of operations.
- Techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures, energisation procedures

T8 LV system switching principles including switching authorisation procedures encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of LV systems and equipment to be switched
- Procedures for obtaining correct LV switching authorization - identification of OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching, procedures for coordination of operations.
- Techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures, energisation procedures.

T9 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise

REQUIRED SKILLS AND KNOWLEDGE

requirements applicable to equipment installation

- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms
- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T10 Principles of power transformer construction and operations encompassing:

- Transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step down transformers, transmission and generation types
- Reactor types - shunt and series, applications and design considerations
- Iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
- Winding configurations and construction techniques - helical, spiral, disc, interleaved disc types
- Insulation methods and techniques - fully insulated windings and graded insulation techniques, oil filled and gas filled power transformers
- Transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, impedance percent
- Nameplate details - BIL, tapping winding detail, physical layout, cooling ratings, physical details
- Transformer and reactor cooling types and their effects on design and rating
- Transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
- Winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
- Operating constraints as single units and in parallel
- Tapping windings - placement issues, tapping range, OLTC versus off load TC techniques, types in use (high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types), control system characteristics.
- High voltage bushing selection – type, insulation system used, rating, BIL, selection criteria, testing considerations

T11 Principles of power transformer construction and operations encompassing:

- Applications of static reactive plant in high voltage networks, including voltage

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control, VAR control, transient response capacity

- Types of static reactive plant including high voltage capacitors, high voltage reactors, static VAR compensators and combinations of these
- Operating characteristics and operational constraints including point on wave switching issues
- Ratings, cooling systems and control systems and ancillary equipment used
- Configurations and system layout including single star, double star, bridge type
- Typical protection systems used including neutral unbalance current, neutral unbalance voltage
- Techniques used when balancing elements within static reactive plant
- Safety precautions when testing and maintaining high voltage static reactive plant - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.

T12 Principles of power transformer high speed on load tap changers encompassing:

- Selector types and applications for high voltage power transformers
- Diverter switch types and applications for high voltage power transformers including live tank, dead tank, resistor type, reactor type, vacuum type, pennant flag, pennant cycle
- Ratings and construction principles
- Operating mechanism types, stored energy systems and associated control systems
- Operating principles and operating sequences of selectors and diverters
- Measurement requirements including contacts, differential wear, transition resistors and transient protection devices, rotation lag, out of sequence controls and end-of-life unit and component assessment
- Online diagnostic tools and devices
- Ancillary equipment including online filters, over pressure relays and devices
- Testing requirements including cycle timing, differential delay, energy accumulator mechanical and operational tests and control system functional tests
- Safety precautions when testing and maintaining high voltage power transformer on load tap changers - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.

T13 Circuit breaker construction principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to circuit breakers
- Requirements for the use of manuals, circuit breaker diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation circuit breakers installed
- Use, characteristics and capabilities of specialised tools and equipment
- Identification of components within the circuit breaker and associated control housings

REQUIRED SKILLS AND KNOWLEDGE

- Identification of energy sources within the circuit breaker and associated control housings
- Identification of insulation paths within the circuit breaker
- Types and characteristics of operating mechanisms
- Types and characteristics of interrupter chambers
- Safety precautions when Constructing circuit breakers - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment

T14 Synchronous Condenser Principles encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to Synchronous Condensers
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of Synchronous Condensers installed
- Identification of components within the Synchronous Condensers and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for Synchronous Condensers
- Techniques in evaluating serviceability of Synchronous Condensers operation
- Safety precautions when testing and measuring Synchronous Condensers - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances, communicating worksite procedures

T15 Operation and maintenance procedures associated with voltage regulation schemes encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the operating procedures
- Requirements for the use of operating manuals, system diagrams/plans and drawings
- Principles of operation and operating sequences - voltage control, VAR control, Live Bus/Dead Bus synchronising checks, tap changer principles, requirements for parallel operations, settings, grading
- Techniques associated with - isolation requirements, enterprise maintenance requirements, setting checks, LV injections, electrical measurements
- Ancillary equipment which may include transducers, Buswire schemes, tap position indicators, local/remote control systems, alarm systems
- Voltage regulation scheme types which may include electro mechanical, micro-processor or combinations of both.

T16 Electrical equipment associated with distribution field device protection and control schemes encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Types and applications of electrical equipment – characteristics, capabilities (schemes: automatic circuit reclosers (ACR's), gas switches, secondary injection tests, primary injection tests, TMR Radio's, SCADA, remote control, overcurrent, earth fault, sensitive earth fault, inverse time curves, definite time curves, tripping, reclose, DC supplies, AC supplies and alarms)

T17 Voltage control techniques encompassing:

- Conditions leading to voltage collapse
- Effects on system of high and low voltage
- Voltage control devices - voltage regulators applied to generators and synchronous phase modifiers, electromagnetic voltage regulators, series and parallel capacitors, OLTC transformers and static VAR compensators (SVC's). SVC's includes saturated reactor compensators; thyristor controlled reactor compensators and combined systems
- Production of harmonics and methods of harmonic control
- Location of voltage control devices within the system

T18 Voltage control devices encompassing:

- Typical devices applications and capacities
- Estimation of rating of VAR regulating devices using graphical techniques

T19 Transient overvoltages encompassing:

- Causes and effects of transient overvoltages - switching transients and lightning transients, effects on plant items
- Control techniques and systems - surge diverters, shield wires and CB arc control
- Insulation systems - insulation systems, insulation coordination and insulation grading.

T20 Commissioning procedures associated with relevant equipment encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures – planning, policy, testing techniques, close out requirements.

T21 Procedures for the location and rectification of faults in electrical equipment up to 1000 volts AC and or 1500 volts DC, encompassing:

- Relationship of Occupational Health and Safety to the location and rectification of faults in electrical equipment - Act and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency First Aid/resuscitation, rescue from a live electrical situation, enterprise policies and procedures.
- Types of drawings - differentiation between symptoms, faults and causes in

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- malfunctioning equipment, fault-finding techniques and procedures
- Fundamental electrical concepts - effects of current, practical resistors, sources of EMF, series, parallel and series-parallel circuits, electrical measurement, capacitors, inductors, magnetism.
- Fundamentals of general appliances - basic principles of appliances (non mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in appliances, fault-finding procedures (prescriptive)
- Fundamentals of single phase induction motors - basic principles of operation (non mathematical), motor identification, motor ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedure, including continuity, fault types in “phase splitting” and universal type motors, fault-finding procedures (prescriptive).
- Fundamentals of three phase induction motors - basic principles of operation (non mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedure, fault-finding procedures (prescriptive)
- Fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedure, fault-finding procedures (prescriptive).

T22 Disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts AC and or 1500 volts DC, encompassing:

- Safe electrical work practices and procedures according to standards such as AS/NZ 4836:2001 or equivalent
- Safe use of tools and plant
- Safe use of ladders and elevated work platforms
- Safe use of protective clothing
- Hazards in the (electrical) work environment - shock hazards, fire hazards, chemical hazards, other hazardous areas
- Special situations
- Procedures for dealing with fires associated with electrical equipment
- Procedures for dealing with PCBs
- Electric shock victim rescue methods and procedures - basic First Aid treatment for shock, burns and bleeding.
- Purpose of each procedure and application - expired air resuscitation (EAR), external cardiac-compression (ECC), cardio-pulmonary resuscitation (CPR), combined application of EAR and ECC (purpose of each procedure and

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application).

- Components of a basic electrical circuit(s) – source, control, protection, load
- Types of circuit diagrams – symbols, conventions, interpretations, free sketches
- Types of circuit connections and functions - open circuit, closed circuit, short circuit
- Techniques in basic electrical measurement - use of multimeters; use of ammeter; use of voltage measuring and indicating devices; testing of measuring instruments; care of measuring instruments; voltage, current and resistance measurement; estimating values of voltage, current and resistance; using ohms law
- Fundamental principles of electrical concepts - effects of current; practical resistors; sources of EMF; simple practical circuit; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors; magnetism
- Techniques in insulation resistance measurement and requirements
- Earthing principles and systems.

T23 Disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts AC and or 1500 volts DC, encompassing:

- Methods for testing insulation resistance - continuity of prospective earthing conductor, continuity between exposed conductive parts and the earthing system
- Methods of recognising acceptable test results for compliance with safety requirements
- Methods of recognising unacceptable test results and require an appropriate qualified person to further investigation
- Cable types and conductor termination methods and techniques - conductors solid, stranded and flexible, colour codes
- Single and three phase systems and loads - number of active and live conductors required, line and phase voltage, typical loads
- Identification and rating of general appliances
- Single phase induction motors - motor identification, motor ratings, direction of rotation
- Three phase induction motors - motor identification, motor ratings, direction of rotation
- Single and three phase heaters - types of heaters, heater identification, heater ratings
- Electrical distribution arrangement - power systems within premises, purpose of switchboards/distribution boards (residual current devices and ELCBs)
- Circuit isolation and protection devices
- Isolation procedures - work clearance, testing for voltage, lock-off and tagging, techniques in isolation and tagging, regulation, codes of practice and procedures
- Disconnection procedures, practices and requirements
- Types of replacement equipment
- Methods of ensuring equipment is safe to connect to supply
- Methods of reconnection procedures, practices and requirements

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- Methods of return equipment to service

T24 Effects of harmonics encompassing:

- Characteristics and effects of harmonics on protection device functions/malfunction
- Effects of harmonics on transformers, generators, motors, quality of supply.

T25 Procedure for the systematic fault isolation through the application of diagnostic techniques encompassing:

- Principles of analytical questioning
- Techniques in drawing valid conclusions from first observations
- Concepts of broad first-line testing
- Consideration of/responsibility for, avoidance of further damage
- Interpretation of specific test results: cause/effect
- Techniques for isolation to appropriate level - half-split, module/function isolation (kernel technique), substitution, diagnostic software, requirements for the use of manuals, system diagrams/plans, drawings, handbooks, specifications and fault pathways.
- Software/firmware functions awareness
- Factors affecting field versus workshop repair costs
- Scheduling minor/major repair activities, downtime
- Implications of temporary repairs
- Use of system knowledge and history
- Data interpretation, expected versus actual
- Feedback to design/production/installation processes
- Subsystems and system structures
- System signals/status indicators
- Known failure modes and trends
- Action threshold warnings versus catastrophic failure
- Component ratings/upgrades
- Disassembly/reassembly techniques and care
- Relative costs of repair and replacement - remaining life, ongoing maintenance, additional benefits of replacement equipment, e.g. improved productivity, quality

T26 Protection schemes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to protection schemes
- Types of protection schemes - reasons for use, application of protection zones around system elements, degree of protection
- Types of feeder protection equipment - over current protection inverse time-current operating characteristics
- Operation of over current protection equipment used on distribution systems
- Operation of ACRs and their time-current characteristics

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- Types and characteristics of over-current relays
- Coordination methods of a distribution feeder protection scheme
- Earth fault protection used on a distribution feeder
- Operation of a single wire earth return (S.W.E.R) system

T27 EHV generator control systems encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the operation of a portable generator
- Safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, synchronising procedures
- Techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load, assessing the appropriateness of the generator
- Operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations, kiosk substations
- EHV generator set and control system to EHV Distribution assets.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord

with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as

- specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Test, on two (2) occasions, at least two (2) of the following:	ACR control box and recloser functions. Line capacitor controller Voltage regulating relay and voltage regulator
B	Commission, on two (2) occasions, at least two (2) of the following.	ACR control box and recloser. Line capacitors. Voltage regulating relay and voltage regulator
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated

		in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance, testing and commissioning of Distribution field devices
- Operational access to relevant plant, protection or metering equipment, scheme drawings, manufacture's specifications/manuals and testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance testing and commissioning of distribution field devices and may include the following equipment:

Voltage regulator, voltage regulating relays, line drop compensators, tap changers, automatic reclosers, gas switches, line capacitors, control boxes, TMR Radio, mobile phones, communications, settings, downloads, min ops, timing tests, energisation, testing, commissioning, primary injection tests, secondary injection tests, SCADA, overcurrent, earth fault. Inverse times, DC supplies, batteries.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Testing Units

UETTDRTS32A Conduct evaluation of power systems primary plant

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the commissioning and maintenance testing requirements for primary plant and equipment. It includes both the practical application of the tests and analysis of results, covering, but is not limited to; applied HV testing and induced HV testing, ratio, polarity, winding resistance, impedance, dielectric loss angle, partial discharge and watts loss insulation resistance and transformer vector group. It encompasses a complete understanding of the nature of the tests being conducted and the ability to conduct the tests in a safe manner.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 6.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to

License to practice**3)**

regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for

Prerequisite Unit(s)	4)	problems in complex multiple path circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRI62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRI63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRTS29A	Develop power systems secondary isolation instructional documents

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the testing of primary plant	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the testing of primary plant systems, are reviewed and determined.
		1.2	Purpose of the testing of primary plant is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the testing of primary plant are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Testing parameters are established from organisational established procedures on policies and specifications.

ELEMENT	PERFORMANCE CRITERIA
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the testing of primary plant	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3 Testing of primary plant decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4 Mathematical/engineering models of the testing of primary plant are used to analyse the effectiveness of the finished project as per requirements and established procedures.
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be

ELEMENT**PERFORMANCE CRITERIA**

- undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing of primary plant is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
- 3 Complete the testing of primary plant
- 3.1 Final inspections of the primary plant are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of the testing of primary plant documents are issues and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of conducting evaluation of primary plant.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS32A Power systems primary plant

Evidence shall show an understanding of power systems primary plant to an extent indicated by the following aspects:

T1 Detailed operation of fundamental test equipment encompassing:

- Care and safe use
- Operating principles
- Comparison of different operating principle meters used for the same purpose
- Accuracy and loading effects of meters - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence and the use of oscilloscopes.

T2 Primary Plant testing encompassing:

- Transformers - DC high voltage tests, AC high voltage tests, induced high voltage tests, ratio tests, polarity tests, winding resistance tests, impedance tests, insulation resistance tests, transformer vector group test, winding temperature indicator test, alarm tests, neutral ct tests
- Circuit breakers - DC high voltage tests, AC high voltage tests, induced high voltage tests, function tests, operation timing, minimum voltage operation test, insulation resistance test, contact resistance test, auxiliary contact test, alarm tests
- Capacitor banks - DC high voltage tests, AC high voltage tests, induced high voltage tests, neutral ct tests, balance tests, insulation resistance.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	<p>Do five (5) of the following tests on primary plant – Transformers.</p> <p>Note: At least two (2) (*) must be included:</p>	<p>*DC high voltage tests, *AC high voltage tests, *induced high voltage tests, Ratio tests Polarity tests Winding resistance tests Impedance tests Insulation resistance tests Transformer vector group test Winding temperature indicator test Alarm tests Neutral CT tests</p>
B	<p>Do five (5) of the following tests on primary plant – Circuit breakers.</p> <p>Note: At least two (2) (*) must be included:</p>	<p>Profiling and contact timing *AC high voltage tests function tests minimum voltage operation test insulation resistance test contact resistance test auxiliary contact test alarm tests</p>
C	<p>Do three (3) of the following tests on primary plant – Capacitor banks.</p>	<p>Cell capacitance measurement Neutral CT tests Balance tests</p>

		Insulation resistance
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual the testing of primary plant.
- Operational access to relevant plant, protection or metering equipment, scheme drawings, manufacture's specifications/manuals and testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and

demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to testing the primary plant and may include the following: transformers, circuit breakers, capacitor banks, DC supplies, remote operated isolators (ROIs), CT's, VTs, oil and winding temperature indicators.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Testing Units

UETTDRTS33A Undertake power systems project management of substation augmentation and maintenance

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the coordination, planning and supervision of projects including but not limited to; commissioning of new plant and equipment, maintenance projects and retrofit works. It includes the coordinating and facilitating of the work of others and the collation of the relevant outcomes and results and involves an overview of both primary and secondary works to ensure completion of all aspects of the project, and must encompass at least 20 identifiable tasks.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 6 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice

3)

safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems

Prerequisite Unit(s)

4)

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in electromagnetic devices and related circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11A Apply sustainable energy and environmental procedures

UETTDREL16A Working safely near live electrical apparatus

UETTDRLS62A Implement and monitor the power system organisational OHS policies, procedures and programs

UETTDRLS63A Implement and monitor the power system environmental and sustainable energy management policies and procedures

Protection Relays and Meters Pathway Unit Group

UETTDRTS28A Repair, test and calibrate protection relays and meters

Metering Pathway Unit Group

UETTDRTS25A Maintain and test and metering schemes

UETTDRTS26A Commission power systems metering schemes

UETTDRTS29A Develop power systems secondary isolation instructional documents

Primary Plant Pathway Unit Group

UETTDRTS29A Develop power systems secondary

Prerequisite Unit(s)

4)

isolation instructional documents

UETTDRTS32A Conduct evaluation of power systems primary plant

Protection Systems Pathway Unit Group

UETTDRTS21A Maintain interdependent network protection and control systems

UETTDRTS29A Develop power systems secondary isolation instructional documents

UETTDRTS35A Maintain complex network protection and control systems

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills

5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the project management of substation augmentation and maintenance	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the undertaking of project management of substation augmentation and maintenance, are reviewed and determined.</p> <p>1.2 Purpose of the undertaking of project management of substation augmentation and maintenance is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Organisational established procedures on policies and specifications for the undertaking of project management of substation augmentation and maintenance are obtained or established with the appropriate personnel.</p> <p>1.4 Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.</p> <p>1.5 Testing parameters are established from organisational established procedures on policies and specifications.</p> <p>1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.</p> <p>1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.</p> <p>1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an</p>

ELEMENT

PERFORMANCE CRITERIA

		acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2	Carry out project management of substation augmentation and maintenance	
	2.1	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2	OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3	Undertaking of project management of substation augmentation and maintenance decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4	Mathematical/engineering models of the undertaking of project management of substation augmentation and maintenance are used to analyse the effectiveness of the finished project as per requirements and established procedures.
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it

ELEMENT

PERFORMANCE CRITERIA

- with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing of substation augmentation and maintenance is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
- 3 Complete the project management of substation augmentation and maintenance
- 3.1 Final inspections of substation augmentation and maintenance are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of the project management of substation augmentation and maintenance documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of undertaking project management of substation augmentation and maintenance.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS33A Power systems substation augmentation and maintenance

Evidence shall show an understanding of power systems substation augmentation and maintenance to an extent indicated by the following aspects:

T1 System components and layouts encompassing:

- Distribution system layouts - overhead/underground, urban/rural, HV customers, high rise building systems, three phase lines, single phase lines, SWER systems, spur, parallel and ring systems, typical substation types.
- Transmission system layouts - lines, buses, transformers and cables, line/bus layouts including single, double, ring and breaker and half systems, HV crossing methods.

T2 AC transmission system components encompassing:

- Support structures and reasons for selection
- Insulators and reasons for selection
- Conductors and reasons for selection
- Vibration management systems and principles
- Line ratings based on voltage, span, tension and temperature

T3 Procedure to undertake a visual inspection of a scheme encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with visual inspection procedures of a scheme
- Requirements for the use of manuals, system diagrams/plans and drawings
- Identify obvious deficiencies in operating to the standard functionality
- Techniques in determining device malfunction
- Techniques in determining wiring defects.

T4 Commissioning procedures associated with relevant equipment encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures – planning, policy, testing techniques,

REQUIRED SKILLS AND KNOWLEDGE

close out requirements.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to

safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	<p>Manage three (3) projects that encompass at least 20 identifiable tasks.</p> <p>Projects should include installation, testing and commissioning stages.</p> <p>The project management skills should include all of the following:</p>	<p>Work planning</p> <p>Coordination of labour resources</p> <p>On site supervision</p> <p>Controlling quality</p> <p>Use of quality systems</p> <p>Planned versus actual comparisons</p> <p>Communication with designers</p> <p>Control of materials</p> <p>Substation primary plant</p> <p>Substation secondary equipment</p> <p>Substations civil projects</p>
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual project management of substation augmentation and maintenance.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to undertaking project management of substation augmentation and maintenance and may include the following.

Projects related to substation activities.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel

RANGE STATEMENT

- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Testing Units

UETTDRTS34A Install and maintain power system communication equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and maintenance of Network Communication Systems and includes the isolation and functional checks of discrete and interdependent communication schemes associated with power systems. It also encompasses power line carrier equipment, protection signalling equipment, radio systems and telephone systems, VF systems, multiplexing systems and fibre optic systems, but does not include wiring.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice**3)**

safety and compliance, industrial relations, environmental protection, anti discrimination and training.
Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems

Prerequisite Unit(s)	4)	
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of

Employability Skills

5)

competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1	Plan for the installation and maintenance of power system communication equipment	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the installation and maintenance of power system communication equipment systems, are reviewed and determined.
		1.2	Purpose of the installation and maintenance of power system communication equipment is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the installation and maintenance of power system communication equipment are obtained or established with the appropriate personnel.
		1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
		1.5	Testing parameters are established from organisational established procedures on policies

ELEMENT	PERFORMANCE CRITERIA
	and specifications
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the installation and maintenance of power system communication equipment	2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
	2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.3 Installation and maintenance of power system communication equipment decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
	2.4 Mathematical/engineering models of the installation and maintenance of power system communication equipment are used to analyse the effectiveness of the finished project as per requirements and established procedures.

ELEMENT**PERFORMANCE CRITERIA**

- | | | | |
|---|---|--|--|
| | 2.5 | Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures. | |
| | 2.6 | Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements. | |
| | 2.7 | Testing of the installed and/or maintained power system communication equipment is undertaken according to requirements and established procedures. | |
| | 2.8 | Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures. | |
| | 2.9 | Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements. | |
| | 2.10 | Quality of work is monitored against personal performance agreement and/or established organisational and professional standards. | |
| | 2.11 | Strategic plans are developed incorporating organisation initiatives as per established procedures. | |
| 3 | Complete the installation and maintenance of power system communication equipment | 3.1 | Final inspections of the installed and/or maintained power system communication equipment are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project. |
| | | 3.2 | Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned. |
| | | 3.3 | Reports and/or completion documents are |

ELEMENT**PERFORMANCE CRITERIA**

submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.

- 3.4 Approved copies of the installation and maintenance of power system communication equipment documents are issues and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installing and maintaining power system communication equipment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS34A Power systems communication equipment

Evidence shall show an understanding of power systems communication equipment to an extent indicated by the following aspects:

T1 Generation systems encompassing:

- Methods of generating electricity - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
- Relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
- The purpose and features of typical types of co-generation systems.

T2 Transmission, distribution and rail systems encompassing:

- Relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
- Characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution including grid type transmission systems, radial, parallel and ring main feeders
- Relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
- Single line drawings and layouts - drawings and layouts of transmission and distribution systems including, radial, parallel and ring main feeders and the HV equipment associated with substations

T3 Substations, power transformers and reactors encompassing:

- Relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
- Characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches including solid state types, efficiency and cooling
- Auxiliary equipment used on transformers - function and basic operation of equipment
- Maintenance of a power transformer - basic connections, restrictions to parallel

REQUIRED SKILLS AND KNOWLEDGE

operation, problems and remedies associated with harmonics, testing and fault finding procedures

- Description, purpose and characteristics of a reactors

T4 Co-ordinating access authority procedures encompassing:

- Specific enterprise processes, policies and procedures to be followed
- Processes of consultation, negotiation and co-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, responsibilities of members of the team.
- Techniques in analysing, planning, co-ordination and organising work for a safe outcome and according to statutory requirements and regulations
- Techniques in the effective utilisation of available resources
- Techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
- Techniques in facilitating and co-ordinating the delivery and issuing of access authorities
- Techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific work site, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, regulatory requirements such as Occupational Health and Safety and electrical safety
- Techniques in the receiving and co-ordinating the cancellation of access authorities in readiness for restoration
- Methods of conducting audits on correct access authority procedures
- Process of issuing of other access authorities for work permits - working in confined space, if required, co-ordination of access authorities, engaging and briefing contractors on electrical and other work
- Issue and receipt of operating agreements.

T5 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T6 HV system switching principles including switching authorisation procedures to an extent indicated by the following aspects:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of HV systems and equipment to be switched
- Procedures for obtaining correct HV switching authorisation - identification of

REQUIRED SKILLS AND KNOWLEDGE

OHS hazards, assessing and controlling risks, Safety procedures and precautions, safe approach distances

- responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, Requirements for team switching, procedures for coordination of operations.
- Techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures, energisation procedures

T7 LV system switching principles including switching authorisation procedures encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to system switching
- Requirements for the use of manuals, system diagrams/plans and drawings
- Types and characteristics of LV systems and equipment to be switched
- Procedures for obtaining correct LV switching authorization - identification of OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching, procedures for coordination of operations.
- Techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures, energisation procedures.

T8 Enterprise Specific Equipment Installation Procedures encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to equipment installation
- Requirements for the use of manuals, substation diagrams/plans and drawings
- Types, characteristics and capabilities of HV substation equipment to be installed
- Identification of components within the equipment to be Installed and associated control housings
- Use, characteristics and capabilities of specialised tools and equipment
- Enterprise Specific Policies and Procedures for equipment to be installed
- Control equipment and auxiliary relays, flags and alarms
- Techniques in evaluating serviceability of equipment to be Installed
- Safety precautions when testing and measuring equipment to be Installed - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment, responsibilities and protocols, safe working clearances
- Remote and local operating principles and conventions

T9 Detailed operation of communication devices and principles encompassing:

- Types of communication systems

REQUIRED SKILLS AND KNOWLEDGE

- Interface to power system equipment
- Hardware configurations
- Testing of communication links

T10 Procedure for the systematic fault isolation through the application of diagnostic techniques encompassing:

- Principles of analytical questioning
- Techniques in drawing valid conclusions from first observations
- Concepts of broad first-line testing
- Consideration of/responsibility for, avoidance of further damage
- Interpretation of specific test results: cause/effect
- Techniques for isolation to appropriate level - half-split, module/function isolation (kernel technique), substitution, diagnostic software, requirements for the use of manuals, system diagrams/plans, drawings, handbooks, specifications and fault pathways.
- Software/firmware functions awareness
- Factors affecting field versus workshop repair costs
- Scheduling minor/major repair activities, downtime
- Implications of temporary repairs
- Use of system knowledge and history
- Data interpretation, expected versus actual
- Feedback to design/production/installation processes
- Subsystems and system structures
- System signals/status indicators
- Known failure modes and trends
- Action threshold warnings versus catastrophic failure
- Component ratings/upgrades
- Disassembly/reassembly techniques and care
- Relative costs of repair and replacement - remaining life, ongoing maintenance, additional benefits of replacement equipment, e.g. improved productivity, quality

T11 Protection schemes encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements applicable to protection schemes
- Types of protection schemes - reasons for use, application of protection zones around system elements, degree of protection
- Types of feeder protection equipment - over current protection inverse time-current operating characteristics
- Operation of over current protection equipment used on distribution systems
- Operation of ACRs and their time-current characteristics
- Types and characteristics of over-current relays
- Coordination methods of a distribution feeder protection scheme

REQUIRED SKILLS AND KNOWLEDGE

- Earth fault protection used on a distribution feeder
- Operation of a single wire earth return (S.W.E.R) system

T12 EHV generator control systems encompassing:

- Legislation, Standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the operation of a portable generator
- Safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, synchronising procedures
- Techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load, assessing the appropriateness of the generator
- Operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations, kiosk substations
- EHV generator set and control system to EHV Distribution assets.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge

and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and

- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Carry out maintenance testing on Substation communications equipment, to include isolation and functional checks on at least three (3) of the following systems:	Supervisory cables Power line carrier systems Protection signalling equipment Telephone systems VF systems Fibre optics
B	Carry out commissioning tests on Substation communications equipment, to include isolation and functional checks on at least three (3) of the following systems:	Supervisory cables Power line carrier systems Protection signalling equipment Telephone systems VF systems Fibre optics
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and

		associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and maintenance of power system communication equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and maintenance of power system communication equipment and may include the following:

Power Line Carrier Equipment, Protection Signalling Equipment, Radio Systems and Telephone Systems, VF Systems, Multiplexing systems and Fibre Optic Systems, but does not include wiring.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues

RANGE STATEMENT

- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Testing Units

UETTDRTS35A Maintain complex network protection and control systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the maintenance of network protection and control systems in complex situations and includes isolation, inspection, monitoring, testing, adjustment, and repair, refurbishment and or overhaul and functional checks. It includes schemes from discrete and interdependent and also schemes such as, distance, differential, transformer differential, bus zone, bus overcurrent, revenue metering, SCADA, communications, harmonic control, point on wave.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 6 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry

License to practice**3)**

safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path

Prerequisite Unit(s)	4)	
		circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDNIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDNIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRTS21A	Maintain interdependent network protection and control systems
	UETTDRTS29A	Develop power systems secondary isolation instructional documents

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the maintenance of network protection and control systems (complex)	1.1 OHS practices/procedures and Environmental and sustainable energy procedures, which may influence the maintenance of, network protection and control systems (complex) are reviewed and determined.
	1.2 Purpose of the maintenance of network protection and control systems (complex) is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Organisational established procedures on policies and specifications for the maintenance of network protection and control systems (complex) are obtained or established with the appropriate personnel.
	1.4 Testing procedures are discussed with and/or directed to the appropriate personnel in order to

ELEMENT**PERFORMANCE CRITERIA**

- ascertain the project brief.
- 1.5 Testing parameters are ascertained from organisational established procedures, policies and specifications
- 1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
- 1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
- 1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
- 1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 2 Carry out the maintenance of network protection and control systems (complex)
- 2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.
- 2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
- 2.3 Maintenance of network protection and control systems (complex) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.
- 2.4 Mathematical and/or engineering models of the scheme are used to analyse the effectiveness of the finished project as per requirements and

ELEMENT**PERFORMANCE CRITERIA**

- established procedures.
- 2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing of network protection and control systems (complex) is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.
- 3 Complete the maintenance of network protection and control systems (complex)
- 3.1 Final inspections of the network protection and control systems (complex) are undertaken to ensure they comply with all requirements and include all specifications and documentation needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for

ELEMENT**PERFORMANCE CRITERIA**

approval and, where applicable, statutory or regulatory approval.

- 3.4 Approved copies of the maintenance of network protection and control systems (complex) documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining network protection and control systems (complex).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS35A Complex network protection and control systems

Evidence shall show an understanding of complex network protection and control systems to an extent indicated by the following aspects:

T1 Principles of power transformer construction and operations encompassing:

- Applications of static reactive plant in high voltage networks, including voltage control, VAR control, transient response capacity
- Types of static reactive plant including high voltage capacitors, high voltage reactors, static VAR compensators and combinations of these
- Operating characteristics and operational constraints including point on wave switching issues
- Ratings, cooling systems and control systems and ancillary equipment used
- Configurations and system layout including single star, double star, bridge type
- Typical protection systems used including neutral unbalance current, neutral unbalance voltage
- Techniques used when balancing elements within static reactive plant
- Safety precautions when testing and maintaining high voltage static reactive plant - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.

T2 Detailed operation of complex protection systems encompassing:

- Distance - characteristics, electromechanical, electronic, impedance, mho, offset mho, switched schemes, non-switched schemes, blocking schemes, bus zone
- Differential, transformer differential, bus overcurrent - principles, feeder protection, transformer protection, bias systems, harmonic restraint, CT connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, CT connections, special considerations, digital systems
- Types of revenue metering
- Applications of SCADA
- Complex protection systems for communications
- Harmonic control
- Point on wave switching.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment

instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables

Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	<p>Do all of the following:</p> <p>Note: Utilise different schemes from within the complex schemes in the Range Statement of this unit.</p>	<p>Isolate protection, control and alarms associated with complex protection and control schemes.</p> <p>Calibrate complex protection and control relays.</p> <p>Carry out function tests (Trips, alarms etc.) on complex protection and control schemes.</p> <p>Write reports on performance of complex protection and control schemes.</p> <p>Isolate 'in service' Current Transformers.</p>
B	<p>Do all of the following:</p>	<p>Activities that address the correction of errors in network protection and control systems</p>
C	<p>At least one occasion</p>	<p>Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.</p>

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintenance of network protection and control systems (complex).

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintenance of network protection and control systems (complex) and may include the following:

Discrete: Overcurrent, earth fault, frame leakage, cooling, buchholz, DC supplies, restricted earth, sensitive earth fault, reclose, DC frame leakage, CEL fail under frequency load shed.

Interdependent :Instrument transformers, trip/control circuits, alarms, DC supplies, CB fail protection, master controlled earth fault, intertripping, blocking, synchronising, pilot wire, phase comparison, load shedding, voltage control, parallel operation, load rejection, circuit isolations and restorations, mechanical adjustments, calibration, function tests, reporting, signals, thermals, contraphase, backup, reverse current

Complex: distance, differential, transformer differential, bus zone, bus overcurrent, revenue metering, SCADA, communications, harmonic control, point on wave.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards

RANGE STATEMENT

- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Testing Units

UETTDRTS36A Commission complex network protection and control systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the commissioning of network protection and control systems in complex situations and includes isolation, inspection, monitoring, testing, adjustment, and repair, refurbishment and or overhaul and functional checks. It includes schemes from discrete and interdependent and also schemes such as, distance, differential, transformer differential, bus zone, bus overcurrent, revenue metering, current transformer accuracy, SCADA, communications, harmonic control, point on wave, HV plant testing.

Application of the Unit

Application of the Unit 2)

This competency standards unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 6 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and

License to practice**3)**

Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training.

Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path

Prerequisite Unit(s)	4)	
		circuits problems
	UEENEEE126A	Provide solutions to basic engineering computational problems
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDNIS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDNIS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRTS21A	Maintain interdependent network protection and control systems
	UETTDRTS22A	Commission interdependent network protection and control systems
	UETTDRTS29A	Develop power systems secondary isolation instructional documents
	UETTDRTS35A	Maintain complex network protection and control systems

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the

following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the commissioning of network protection and control systems (complex)	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of, network protection and control systems (complex) are reviewed and determined.
		1.2	Purpose of the commissioning of network protection and control systems (complex) is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures on policies and specifications for the commissioning of network protection and control systems

ELEMENT	PERFORMANCE CRITERIA
	(complex) are obtained or established with the appropriate personnel.
	1.4 Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment is selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the commissioning of network protection and control systems (complex)	<p>2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures.</p> <p>2.2 OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.</p> <p>2.3 Commissioning of network protection and control systems (complex) decisions are made on the basis of safety and effective outcomes</p>

ELEMENT**PERFORMANCE CRITERIA**

- according to requirements and/or established procedures.
- 2.4 Mathematical and/or engineering models of the schemes are used to analyse the effectiveness of the finished project as per requirements and established procedures.
- 2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.
- 2.7 Testing of network protection and control systems (complex) is undertaken according to requirements and established procedures.
- 2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures.
- 2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete the commissioning of network protection and control systems (complex)	<p>3.1 Final inspections of the network protection and control systems (complex) are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project.</p> <p>3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of the commissioning of network protection and control systems (complex) documents are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of commissioning network protection and control systems (complex).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS36A Complex network protection and control systems -
commissioning

Evidence shall show an understanding of complex network protection and control systems – commissioning to an extent indicated by the following aspects:

T1 Principles of Statutory and safety considerations encompassing:

- Commonwealth/State/Territory legislation, standards, codes, supply authority regulations and or enterprise requirements associated with working on High Voltage
- Particular reference to State and Territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures, licensing rules.

T2 Electrical equipment associated with protection and control schemes encompassing:

- Types and applications of electrical equipment – characteristics, capabilities (schemes: overcurrent, frame leakage, cooling, buchholz, DC supplies, restricted earth, sensitive earth fault, CB fail, reclose, DC frame leakage, CEL Fail, under frequency load shed and earth fault)

T3 Principles of isolation and tagging procedures associated with protection testing encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
- Requirements for the use of, isolation and tagging, manuals, system diagrams/plans and drawings
- Techniques in documenting isolations
- Techniques in appropriate isolation and tagging procedures as per Commonwealth/State/Territory legislation, supply authority regulations and enterprise standards
- Techniques in the installation and maintenance procedures protection devices as per Commonwealth/State/Territory legislation, supply authority regulations and enterprise standards

T4 Maintenance and commissioning procedures associated with discrete

REQUIRED SKILLS AND KNOWLEDGE

protection schemes encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the maintenance and commissioning procedures
- Requirements for the use of maintenance and commissioning manuals, system diagrams/plans and drawings
- Techniques in maintenance and commissioning procedures – planning, policy, testing techniques
- Close out requirements

T5 Relay manufacturer specifications encompassing:

- Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of relay manufacturer specifications
- Requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
- Types, function and characteristics of specific relays - differences between specific relays used for the same functionality

T6 Safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants encompassing:

- Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the handling and disposing of insulation or heat dissipation materials used in power distribution devices
- Identification of environmental issues associated with the handling and disposing of insulation materials
- Safety precautions when handling and disposing of heat dissipation materials - safe working practices, Occupational Health and Safety hazards and precautions, identification of hazards, assessing and controlling risks, types, selection, maintenance and uses of personnel protective equipment, permit to work systems and isolation procedures, types and function of specialised equipment, safe working practices when using specialised equipment, emergency response and rescue including First Aid etc.
- Techniques in the handling and disposing of insulation materials - Polychlorinated Bi-Phenyls (PCB's), asbestos, insulating Oil, SF6 gas.

T7 Procedure to undertake a visual inspection of a scheme encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with visual inspection procedures of a scheme
- Requirements for the use of manuals, system diagrams/plans and drawings
- Identify obvious deficiencies in operating to the standard functionality
- Techniques in determining relay malfunction - targeting

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in determining wiring defects

T8 Operation and maintenance procedures associated with discrete protection and control systems encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with operating procedures
- Requirements for the use of operating manuals, system diagrams/plans and drawings
- Techniques - gas collection and analysis, bleeding and resetting, calibration, operational and sensitivity checks, trip and alarm checks
- Surge relay types and uses, including transformer main tanks, diverter switch chambers

T9 Commissioning procedures associated with discrete protection and control systems encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- Requirements for the use of commissioning manuals, system diagrams/plans and drawings
- Techniques in commissioning procedures – planning, policy, testing techniques, close out requirements.

T10 Measurements and the interpretation and analysis of those measurements related to the plant and/or equipment type encompassing:

- Type of measurements - timing, current, voltage, capacitance, inductance, impedance, phase angle, phase shift, resistance, dielectric dissipation factor, frequency, polarisation index, ratio, vector group, temperature
- Interpretation and analysis the use of techniques - digital comparison of data, extrapolation, use of graphs and charts, statistics and tables, mathematical calculation of expected values and comparison with manufacturers data and measurements
- Techniques in the processes involved in follow-up actions and recommendations resulting from analysis and interpretation of results and measurements.

T11 Principles of power transformer construction and operations encompassing:

- Applications of static reactive plant in high voltage networks, including voltage control, VAR control, transient response capacity
- Types of static reactive plant including high voltage capacitors, high voltage reactors, static VAR compensators and combinations of these
- Operating characteristics and operational constraints including point on wave switching issues
- Ratings, cooling systems and control systems and ancillary equipment used
- Configurations and system layout including single star, double star, bridge type
- Typical protection systems used including neutral unbalance current, neutral

REQUIRED SKILLS AND KNOWLEDGE

unbalance voltage

- Techniques used when balancing elements within static reactive plant
- Safety precautions when testing and maintaining high voltage static reactive plant - safe working practices and procedures, identification of hazards, assessment and control of OHS risks, types, selection, maintenance and use of personal protective equipment.

T12 Types and applications of test equipment encompassing:

- Standards, codes, Commonwealth, State/Territory and local government legislation, supply authority regulations and or enterprise requirements applicable to the use and application of electrical and/or electronic test equipment
- Types and applications of test equipment used on discrete protection scheme
- Techniques in the use of test equipment - electronic test equipment (Doble, Ohmicrome), gas injection equipment, manufactures test equipment, multimeters, phase angle meters, meggers

T13 Detailed operation and setting of discrete protection systems encompassing:

- Earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination, backup protection
- Overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination, backup protection
- Alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, over temperature schemes

T14 Detailed operation of interdependent protection systems encompassing:

- Overcurrent and earth leakage schemes including intertripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic, shading coils
- Pilot wire, phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme, pilot supervisory techniques,
- Load shedding, voltage control, parallel operation, load rejection
- Busbar Protection and CB failure protection
- Reclose systems - applications, single shot, multishot, blocking schemes, synchronisation checking.

T15 Detailed operation of complex protection systems encompassing:

- Distance - characteristics, electromechanical, electronic, impedance, mho, offset mho, switched schemes, non-switched schemes, blocking schemes, bus zone
- Differential, transformer differential, bus overcurrent - principles, feeder protection, transformer protection, bias systems, harmonic restraint, CT

REQUIRED SKILLS AND KNOWLEDGE

connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, CT connections, special considerations, digital systems

- Types of revenue metering
- Applications of SCADA
- Complex protection systems for communications
- Harmonic control
- Point on wave switching.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills;

and

- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Do all of the following: Note: Utilise different schemes from within the complex schemes in the Range Statement of this unit.	Commissioning of a protection and control system involving five (5) complex schemes
B	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.

- Suitable work environment, facilities, equipment and materials to undertake actual commissioning of network protection and control systems (complex).

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment**9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units**9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the commissioning of network protection and control systems (complex) and may include the following:

Discrete: overcurrent, earth fault, frame leakage, cooling, busbar, DC supplies, restricted earth, sensitive earth fault, CB fail, reclose, DC frame leakage, CEL fail, under frequency load shed;

Interdependent: instrument transformers, trip/control circuits, alarms, DC supplies, CB fail protection, master controlled earth fault, intertripping, blocking, synchronising, pilot wire, phase comparison, load shedding, voltage control, parallel operation, load rejection, circuit isolations and restorations, mechanical adjustments, calibration, function tests, reporting, signals, thermals, contraphase, backup, reverse current;

Complex: distance, differential, transformer differential, bus zone, bus overcurrent, revenue metering, current transformer accuracy, SCADA, communications, harmonic control, point on wave, HV plant testing.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards

RANGE STATEMENT

- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Testing Units

UETTDRTS37A Perform current injection testing using phantom load

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the performance of current injecting testing using a phantom load. It includes the application of artificial load onto low voltage current transformers (CT) to determine correct meter function while ensuring testing is conducted in accordance with established procedures.

It also includes the validation of secondary wiring circuits to determine the correct operation of the metering scheme.

Application of the Unit

Application of the Unit 2)

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the

recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic

Prerequisite Unit(s)	4)	
		devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEG171A	Install, set up and commission interval metering
	UETTDREL11A	Apply sustainable energy and environmental procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Plan for the performance of current injection testing using phantom load	1.1	OHS practices/procedures and environmental and sustainable energy procedures, which may influence the performance of current injection testing using phantom load, are reviewed and determined.
		1.2	Purpose of the performance of current injection testing using phantom load is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
		1.3	Organisational established procedures, policies and specifications for the performance of current injection testing using phantom load are obtained or established with the appropriate personnel.
		1.4	Performance of current injection testing using phantom load procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.

ELEMENT	PERFORMANCE CRITERIA
1.5	Current injecting testing parameters are established from organisational established procedures, policies and specifications
1.6	Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
1.7	Work roles and tasks are allocated according to requirements and individuals' competencies.
1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work.
1.10	Risk control measures are identified, prioritised and evaluated against the work schedule.
1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the performance of current injection testing using phantom load	<p>2.1 OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.</p> <p>2.2 Decisions with regard to performance of current injection testing using phantom load are made on the basis of safety and effective outcomes according to requirements and/or established procedures.</p> <p>2.3 Mathematical/engineering models for the application of current injection testing using phantom load are used to analyse the effectiveness of the finished project as per requirements and established procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
	<p>2.4 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.</p> <p>2.5 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements.</p> <p>2.6 Application of current injection testing using phantom load is undertaken according to requirements and established procedures.</p> <p>2.7 Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements.</p> <p>2.8 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.</p>
3 Complete the performance of current injection testing using phantom load	<p>3.1 Final inspections of the low voltage current transformers are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project.</p> <p>3.2 Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of the application of current injection testing using phantom load, documents are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of the application of current injection testing using phantom load.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS37A Current injection testing using phantom load for energy/revenue metering

Evidence shall show an understanding of the performance of current injection testing using phantom load for energy/revenue metering to an extent indicated by the following aspects:

- T1 The application of current to an existing customer load through the primary of the Current Transformer
- T2 Understanding the principles of Current Transformer operation
- T3 Determine the loading of the CT to apply the appropriate level of current required to verify the CT ratio, polarity and secondary wiring
- T4 Identifying any impacts of testing on market settlement/financial data and managing the data substitution requirements.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment,

such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Perform, on at least three (3) occasion, the following::	Application of artificial load onto low voltage CT for injection of current to determine correct meter function testing
B	Perform, on at least three (3) occasion, the following::	Validation of secondary wiring circuits to determine the correct operation of the metering scheme.
C	Demonstrate, on at least one (1)	Dealing with an unplanned event by

	occasion, the following:	drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual application of current injection testing using phantom load.
- Operational access to relevant plant, drawings, manufacture's specifications/manuals and specialised testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UEENEEG07 Install and replace low voltage current transformer
6A metering

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the performance of the application of current injection testing using phantom load and may include the following:

The use of a device that applies an artificial load to low voltage current transformers to prove the functionality of metering schemes.

It includes the application of artificial load onto low voltage CT for injection of current to determine correct meter function testing of metering installations while ensuring testing is conducted in accordance with established procedures.

Inform the meter data provider to follow National Meter Identifier (NMI) data substitution rules for the period energy was injected.

It also includes the validation of secondary wiring circuits to determine the correct operation of the metering scheme.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards

RANGE STATEMENT

- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Testing Units

UETTDRTS38A Install and replace high voltage metering and associated equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and replacement of high voltage metering and associated equipment. Replacement may include the identification of faults in accordance with established procedures and return to service. It includes the requirements to ascertain if normal functions of the meters and associated equipment are in accordance with operating standards.

Application of the Unit

Application of the Unit 2)

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and

relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only

Prerequisite Unit(s)

4)

after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG076A	Install and replace low voltage current transformer metering
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic

Prerequisite Unit(s)	4)	
		devices and related circuits
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEG171A	Install, set up and commission interval metering
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRTS37A	Perform current injection testing using phantom load

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|---|-----|---|
| 1 | Plan for the installation and replacement of high voltage metering and associated equipment | 1.1 | OHS practices/procedures and environmental and sustainable energy procedures, which may influence the installation and replacement of high voltage metering and associated equipment are reviewed and determined. |
| | | 1.2 | Purpose of the installation and replacement of high voltage metering and associated equipment is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel. |
| | | 1.3 | Organisational established procedures, policies and specifications for the installation and replacement of high voltage metering and associated equipment are obtained or established |

ELEMENT

PERFORMANCE CRITERIA

with the appropriate personnel.

- 1.4 Installation and replacement of high voltage metering and associated equipment procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
 - 1.5 Installation and replacement parameters are established from organisational established procedures, policies and specifications.
 - 1.6 Equipment/tools and personal protective equipment is selected based on specified Performance Criteria and established procedures.
 - 1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
 - 1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
 - 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients, customers are resolved and activities coordinated to carry out work.
 - 1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
 - 1.11 Relevant internal and external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures.
- 2 Carry out the installation and replacement of high voltage metering and associated equipment
- 2.1 OHS and sustainable energy principles, functionality and practices to prevent accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
 - 2.2 Installation and replacement of high voltage metering and associated equipment decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures.

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|---|------|--|
| 3 | Complete the installation and replacement of high voltage metering and associated equipment | 2.3 | Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures. |
| | | 2.6 | Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements. |
| | | 2.7 | Installation and replacement of high voltage metering and associated equipment is undertaken according to requirements and established procedures. |
| | | 2.8 | Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures. |
| | | 2.9 | Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements. |
| | | 2.10 | Quality of work is monitored against personal performance agreement and/or established organisational and professional standards. |
| | | 3.1 | Final inspections of the installation and replacement of high voltage metering and associated equipment are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project. |
| | | 3.2 | Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes. |
| | | 3.3 | Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or |

ELEMENT

PERFORMANCE CRITERIA

regulatory approval.

- 3.4 Approved copies of the installation and replacement of high voltage metering and associated equipment documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installation and replacement of high voltage metering and associated equipment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS38A HV metering and associated equipment used in a regulated energy market

Evidence shall show an understanding of the installation and replacement of high voltage metering and associated equipment in a regulated energy market to an extent indicated by the following aspects:

T1 Associated equipment may include: fuses, CT's, VT's, test block, ct chamber, marshalling kiosk, wiring, voltage fail relays, sealing equipment, terminals, links, modems, communications equipment, direct current supplies, aerials, optical isolation equipment, fibre optics, solid state recorders, pulse repeat relays, pulsing outputs, energy/distribution management systems, communication interface modules, alarms

T2 Selection of suitable equipment to meet site requirements and other requirements as prescribed by the Regulated Energy Market Rules

T3 Communicating as required with market participants, including Meter Data Provider, Responsible Person

T4 Meter storage, handling and disposal processes in accordance with enterprise policies and procedures

T5 Awareness of jurisdictional rules and requirements to allow work to be performed in Local Network Service Provider areas

T6 Standards, Codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the installation and replacement of high voltage metering and associated equipment procedures

T7 Use of enterprise and or manufacturers manuals, system diagrams/plans and drawings and other related documentation for the installation and replacement of high voltage metering and associated equipment

T8 Work in accordance with the enterprises' safe systems of work

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Perform installation and replacement, on at least three (3) occasions, at least three (3) of the following:	High voltage metering schemes High voltage zone substation metering schemes High voltage bulk supply point metering schemes Low voltage summation metering schemes
B	Perform, on at least three (3) occasions, the installation and replacement of the following:	High voltage current/voltage transformers (including return to service) Energy meters Associated equipment
C	Perform, on at least one (1) occasion, the following activity:	Installation or replacement of a typical High Voltage Bulk Supply Point metering scheme
D	Demonstrate, on at least one (1) occasion, the following:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a

workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and replacement of high voltage metering and associated equipment.
- Operational access to relevant plant, drawings, manufacture's specifications/manuals and specialised testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and replacement of high voltage metering and associated equipment and may include the following:

High voltage metering schemes including; high voltage zone substations, bulk supply points and customers installations.

It may also include low voltage metering and summation current transformer metering.

Ensure that meter and associated equipment selected for the job will meet the requirements.

Installation may include the removal and return to service of high voltage current/voltage transformers, energy meters and associated equipment.

Replacement may occur in a variety of complex environments (bulk supply points, protection arrangements etc.) and contexts.

Associated equipment includes communications, metering voltage and current transformers, switching devices, fuses, links, meter boards, panels, recorders and power quality equipment.

Energy meters include electronic and induction disc meters.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation

RANGE STATEMENT

- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Testing Units

UETTDRTS39A Maintain compliance with national electricity market metrology practices and procedures

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers demonstrating and understanding of the Regulated Energy Market national regulations to daily work practices of a Customer's Revenue metering Installation.

It also includes demonstrating detailed knowledge of the individual's role and responsibilities as the onsite representative of the Metering Provider.

Application of the Unit

Application of the Unit 2)

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and

relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only

Prerequisite Unit(s)

4)

after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG076A	Install and replace low voltage current transformer metering
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic

Prerequisite Unit(s)	4)	
UEENEEG103A	Install low voltage wiring and accessories	devices and related circuits
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations	
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations	
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits	
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations	
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
UEENEEG109A	Develop and connect electrical control circuits	
UEENEEG171A	Install, set up and commission interval metering	
UETTDREL11A	Apply sustainable energy and environmental procedures	
UETTDREL15A	Respond to power systems technical enquiries and requests	
UETTDREL16A	Working safely near live electrical apparatus	
UETTDRTS37A	Perform current injection testing using phantom load	
UETTDRTS38A	Install and replace high voltage metering and associated equipment	

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the maintaining of compliance with national electricity market metrology practices and procedures	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the maintaining of compliance with national electricity market metrology practices and procedures are reviewed and determined.
	1.2 Purpose of the maintaining of compliance with national electricity market metrology practices and procedures is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Organisational established procedures, policies and specifications for the maintaining of compliance with national electricity market metrology practices and procedures are obtained or established with the appropriate personnel.
	1.4 Maintenance of compliance with national electricity market metrology practices and procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
	1.5 Maintenance of compliance with national electricity market metrology practices and procedures parameters are established from organisational established procedures, policies and specifications.
	1.6 Equipment/tools and personal protective equipment is selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with

ELEMENT

PERFORMANCE CRITERIA

- other/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work.
- 1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
- 1.11 Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures.
- 2 Carry out the maintaining of compliance with national electricity market metrology practices and procedures
- 2.1 OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
- 2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures.
- 2.3 Lifting, climbing, and use of powertools/equipment, techniques and practices are safely exercised according to requirements.
- 2.4 Hazard warnings and safety signs are recognized and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
- 2.6 Testing equipment is used in accordance with the work schedule and requirements and/or established procedures.
- 2.7 Routine management of compliance issue with national electricity market metrology practices & procedures is carried out in accordance with the work schedule
- 2.8 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be

ELEMENT

PERFORMANCE CRITERIA

- undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.9 Essential knowledge and associated skills are applied in the maintaining of compliance with national electricity market metrology practices and procedures to ensure completion in an agreed timeframe according to requirements.
- 2.10 Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements.
- 2.11 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 3 Complete the maintaining of compliance with national electricity market metrology practices and procedures
- 3.1 Final compliance inspections with the maintenance of compliance with national electricity market metrology practices and procedures are undertaken to ensure they conform to all requirements and include all specifications and documents needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the maintaining of compliance with national electricity market metrology practices and procedures, documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of maintaining of compliance with national electricity market metrology practices and procedures.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS39A Maintenance of Revenue Metering operations within a Regulated Energy Market

Evidence shall show an understanding of the application of standards applicable to meter service provision in a regulated energy market to an extent indicated by the following aspects:

- T1 Navigation of the Internet to ascertain current technical and procedural standards applicable to meter provision within the regulated energy market.
- T2 Interpret and apply current technical and procedural standards applicable to meter provision within the regulated energy market.
- T3 Maintain customer and metering documentation in accordance with enterprise and regulator requirements applicable to meter service provision in the regulated energy market.
- T4 Processes and procedures applicable
- T5 Identify and manage risks to compliance
- T6 Duties and obligations of market participants
- T7 Timeframes applicable to metering
- T8 Legal obligations of market and non-market participants
- T9 Other relevant legislations, OHS, Trade practices act
- T10 Exemption procedures, data substitution procedures
- T11 Categories and types of metering installations
- T12 Accuracy class for types 1-7
- T13 Customer negotiations skills
- T14 ISO 9001 accreditation, 14001 and 3860 OHS)
- T15 Auditing course
- T16 Service Level Requirements
- T17 Meter Asset Mgmt Plan
- T18 Penalties for non compliance
- T19 Interrogate and interpret meter register, type of site, installation date, overall

REQUIRED SKILLS AND KNOWLEDGE

accuracy, ratios.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to

safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Perform, on at least three (3) occasions, the following activity:	Maintain the compliance of a Customer's Revenue metering Installation with the Metrology Practices and Procedures of the National Electricity Market
B	Demonstrate on least one (1) occasions, the following activity:	The ability to locate, interpret and apply National Electricity Market rules
C	Demonstrate, on at least one (1) occasion, the following:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual maintaining of compliance with national

electricity market metrology practices and procedures.

- Operational access to relevant plant, drawings, manufacture's specifications/manuals and specialised testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the maintaining of compliance with national electricity market metrology practices and procedures and may include the following:

Maintaining the compliance of a Customer's Revenue metering Installation with the Metrology Practices and Procedures of the National Electricity Market.

Ability to apply Regulated Energy Market rules to work practices.

Demonstrate ability to locate, interpret and apply National Electricity Market rules.

Perform work activities in accordance with meter provision policies and procedures.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS

RANGE STATEMENT

- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Testing Units

UETTDRTS40A Test and maintain energy/revenue metering schemes

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the testing and maintenance of energy/revenue metering schemes. It includes testing, isolation, inspection, monitoring, adjustment, repair, refurbishment and or overhaul and functional checks of energy/revenue metering schemes.

It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures, compliance to tariff requirements, revenue billing, energy registration and the identification of faults with metering equipment in accordance with established procedures.

Application of the Unit

Application of the Unit 2)

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG076A	Install and replace low voltage current transformer metering

Prerequisite Unit(s)	4)	
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEG171A	Install, set up and commission interval metering
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL15A	Respond to power systems technical enquiries and requests
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRTS37A	Perform current injection testing using phantom load
	UETTDRTS38A	Install and replace high voltage

Prerequisite Unit(s)	4)	metering and associated equipment
	UETTDRTS39A	Maintain compliance with national electricity market metrology practices and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the testing and maintenance of energy/revenue metering schemes	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the testing and maintenance of energy/revenue metering schemes, are reviewed and determined.</p> <p>1.2 Purpose of testing and maintenance of energy/revenue metering schemes is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Organisational established procedures, policies and specifications for the testing and maintenance of energy/revenue metering schemes are obtained or established with the appropriate personnel.</p> <p>1.4 Testing and maintenance of energy/revenue metering schemes procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.</p> <p>1.5 Testing and maintenance parameters are established from organisational established procedures, policies and specifications</p> <p>1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.</p> <p>1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.</p> <p>1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.</p> <p>1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work.</p> <p>1.10 Risk control measures are identified, prioritised</p>

ELEMENT**PERFORMANCE CRITERIA**

- and evaluated against the work schedule.
- 1.11 Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures.
- 2 Carry out the testing and maintenance of energy/revenue metering schemes
- 2.1 OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
- 2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures.
- 2.3 Lifting, climbing, and use of powertools/equipment, techniques and practices are safely exercised according to requirements.
- 2.4 Hazard warnings and safety signs are recognized and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
- 2.6 Testing equipment is used in accordance with the work schedule and requirements and/or established procedures.
- 2.7 Routine testing and acceptance testing of the installation, testing & maintenance of revenue metering schemes is carried out in accordance with the work schedule
- 2.8 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.

ELEMENT	PERFORMANCE CRITERIA
	2.9 Essential knowledge and associated skills are applied in the safe testing and maintenance of energy/revenue metering schemes to ensure completion in an agreed timeframe according to requirements.
	2.10 Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements.
	2.11 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
3 Complete the testing and maintenance of energy/revenue metering schemes	3.1 Final inspections of the testing and maintenance of energy/revenue metering schemes using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project.
	3.2 Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
	3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the testing and maintenance of energy/revenue metering schemes, documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired installation, testing & maintenance of revenue metering schemes.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS40A Testing and maintenance of energy/revenue metering schemes

Evidence shall show an understanding of the testing and maintenance of energy/revenue metering schemes to an extent indicated by the following aspects:

T1 Operation of energy metering test equipment

T2 Test equipment may include: voltmeters, amp meters, ohm meters, kWh/kVarh standards, tong ammeters, phase rotation meter, power factor meters, power quality meters, phantom load devices, current/voltage injection devices, measurement bridges, insulation resistance tester, phase angle meters, multimeters, standard CT's / VT's, insulated operating sticks,

T3 Other equipment may include: personal computer, calculator, stop watches, printers, telecommunication devices, GPS,

T4 Knowledge of test principles and theories

T5 Techniques in the testing and maintenance procedures of energy metering schemes as per Commonwealth/State/Territory legislation, supply authority regulations and enterprise standards

T6 Ensure compliance with ISO 9001 and jurisdictional Quality Mgmt Systems

T7 Evaluation of test results to ensure compliance with ISO and Aust Standards

T8 Notification of non-compliance to relevant parties.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects of 9.2)
evidence required
to demonstrate
competency in
this unit**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List

A	Perform, on at least Three (3) occasion, testing/maintaining includes all of the following activity:	<p>ensuring meter function determining energy flows, voltage, current and phasor relationships</p> <p>Inspection/monitoring</p> <p>Gathering of information to ensure the application of standards and specifications have been met</p> <p>Specific notification of faults with metering equipment affecting energy registration and revenue billing in accordance with established procedures</p> <p>Ensuring that the installation is operating within prescribed limits (enterprise, manufacturers, regulated energy market requirements)</p> <p>Making recommendations, adjustments, replacement and repair.</p>
B	Perform, on at least three (3) occasions, the following activity:	<p>Isolation, at local fuses and links</p> <p>Determining against standards if additional isolation is required.</p>
C	Demonstrate, on at least three (3) occasions, the functionality of the metering scheme in accordance with:	<p>Electrical installation (state and national) standards</p> <p>Metrology procedures</p> <p>Compliance to tariff requirements</p>

D	Demonstrate, on at least one (1) occasion, the following:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual testing and maintenance of energy/revenue metering schemes.
- Operational access to relevant plant, drawings, manufacture's specifications/manuals and specialised testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills

described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the testing and maintenance of energy/revenue metering schemes and may include the following:

Isolation, at local fuses and links and determining against standards if additional isolation is required.

Testing/maintaining includes:

- ensuring meter function
- determining energy flows, voltage, current and phasor relationships
- Inspection/monitoring
- Gathering of information to ensure the application of standards and specifications have been met
- Specific notification of faults with metering equipment affecting energy registration and revenue billing in accordance with established procedures
- Ensuring that the installation is operating within prescribed limits (enterprise, manufacturers, regulated energy market requirements)
- Making recommendations, adjustments, replacement and repair.

It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures and compliance to tariff requirements.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation

RANGE STATEMENT

- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Testing Units

UETTDRTS41A Install and replace complex energy/revenue metering schemes and associated equipment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the installation and replacement of energy/revenue meters and associated equipment in complex situations. Replacement may include the identification of faults in accordance with established procedures and return to service. It includes the requirements to ascertain if normal functions of the meters and associated equipment are in accordance with operating standards.

Application of the Unit

Application of the Unit 2)

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the

recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG076A	Install and replace low voltage current transformer metering

Prerequisite Unit(s)	4)
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UEENEEG103A	Install low voltage wiring and accessories
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits
UEENEEG171A	Install, set up and commission interval metering
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL15A	Respond to power systems technical enquiries and requests
UETTDREL16A	Working safely near live electrical apparatus
UETTDRTS37A	Perform current injection testing using phantom load
UETTDRTS38A	Install and replace high voltage

Prerequisite Unit(s)	4)	metering and associated equipment
	UETTDRTS39A	Maintain compliance with national electricity market metrology practices and procedures
	UETTDRTS40A	Test and maintain energy/revenue metering schemes

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the installation and replacement of energy/revenue metering schemes and associated equipment (complex)	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the installation and replacement of energy/revenue metering schemes and associated equipment (complex) are reviewed and determined.
	1.2 Purpose of the installation and replacement of energy/revenue metering schemes and associated equipment (complex) is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Organisational established procedures, policies and specifications for the installation and replacement of energy/revenue metering schemes and associated equipment (complex) are obtained or established with the appropriate personnel.
	1.4 Installation and replacement of energy/revenue metering schemes and associated equipment (complex) procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
	1.5 Installation and replacement parameters are established from organisational established procedures, policies and specifications.
	1.6 Equipment/tools and personal protective equipment is selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients, customers are resolved and activities coordinated

ELEMENT

PERFORMANCE CRITERIA

to carry out work.

- | | | | |
|---|--|------|--|
| 2 | Carry out the installation and replacement of energy/revenue metering schemes and associated equipment (complex) | 1.10 | Risk control measures are identified, prioritised and evaluated against the work schedule. |
| | | 1.11 | Relevant internal and external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures. |
| | 2.1 | | OHS and sustainable energy principles, functionality and practices to prevent accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures. |
| | 2.2 | | Installation and replacement of energy/revenue metering schemes and associated equipment (complex) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures. |
| | 2.3 | | Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures. |
| | 2.6 | | Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements. |
| | 2.7 | | Installation and replacement of energy/revenue metering schemes and associated equipment (complex) is undertaken according to requirements and established procedures. |
| | 2.8 | | Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures. |
| | 2.9 | | Solutions to non-routine problems are identified and actioned, using essential knowledge and |

ELEMENT

PERFORMANCE CRITERIA

- associated skills, according to requirements.
- 2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 3 Complete the installation and replacement of energy/revenue metering schemes and associated equipment (complex)
- 3.1 Final inspections of the installation and replacement of energy/revenue metering schemes and associated equipment (complex) are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project.
- 3.2 Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of the installation and replacement of energy/revenue metering schemes and associated equipment (complex) documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of installation and replacement of energy/revenue metering schemes and associated equipment (complex).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS41A Installation and replacement of complex energy/revenue metering schemes and associated equipment in a regulated energy market

Evidence shall show an understanding of the installation and replacement of complex energy/revenue metering schemes and associated equipment in a regulated energy market to an extent indicated by the following aspects:

T1 Associated equipment may include: summation ct's, voltage selection relays, auxiliary supply relays, voltage fail relays, fibre optics, data concentrators, in house displays.

T2 The installation and replacement of complex energy/revenue metering schemes and associated equipment shall comply with enterprise policies and procedures applicable to the work - impact of work on local network system integrity, substation entry and access requirements, impacts of isolation on protection and control systems.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for

apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Perform installation and replacement, on at least three (3) occasions, at least three (3) of the following:	High voltage metering schemes High voltage zone substation metering schemes High voltage bulk supply point metering schemes Low voltage summation metering schemes
B	Perform, on at least three (3) occasions, the installation and replacement of the following:	High voltage current/voltage transformers (including return to service)

		Energy meters Associated equipment
C	Perform, on at least one (1) occasion, the following activity:	Installation or replacement of a typical High Voltage Bulk Supply Point metering scheme
D	Demonstrate, on at least one (1) occasion, the following:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual installation and replacement of energy/revenue metering schemes and associated equipment (complex).
- Operational access to relevant plant, drawings, manufacture’s specifications/manuals and specialised testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods

given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the installation and replacement of energy/revenue metering schemes and associated equipment (complex) and may include the following:

High voltage metering schemes including; high voltage zone substations, bulk supply points and customers installations.

It may also include low voltage metering and summation current transformer metering.

Ensure that meter and associated equipment selected for the job will meet the requirements.

Installation may include the removal and return to service of high voltage current/voltage transformers, energy meters and associated equipment.

Replacement may occur in a variety of complex environments (bulk supply points, protection arrangements etc.) and contexts.

Associated equipment includes communications, metering voltage and current transformers, switching devices, fuses, links, meter boards, panels, recorders and power quality equipment.

Energy meters include electronic and induction disc meters.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation

RANGE STATEMENT

- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Testing Units

UETTDRTS42A Management of energy registration data errors for revenue billing purposes

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers management of energy registration data errors for revenue billing purposes. It covers the identification of energy registration error within a metering scheme. Evaluate the impact on the energy registration and customer billing data and making recommendation for billing corrections and market settlement data updates.

Application of the Unit

Application of the Unit 2)

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and

relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only

Prerequisite Unit(s)

4)

after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG076A	Install and replace low voltage current transformer metering
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic

Prerequisite Unit(s)	4)	devices and related circuits
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEG171A	Install, set up and commission interval metering
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL15A	Respond to power systems technical enquiries and requests
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRTS37A	Perform current injection testing using phantom load
	UETTDRTS38A	Install and replace high voltage metering and associated equipment
	UETTDRTS39A	Maintain compliance with national electricity market metrology practices and procedures

Prerequisite Unit(s) 4)

UETTDRTS40A Test and maintain energy/revenue metering schemes

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the Management of energy registration data errors for revenue billing purposes	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the management of energy registration data errors for revenue billing purposes are reviewed and determined.
	1.2 Purpose of the management of energy registration data errors for revenue billing purposes is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Organisational established procedures, policies and specifications for the management of energy registration data errors for revenue billing purposes are obtained or established with the appropriate personnel.
	1.4 Management of energy registration data errors for revenue billing purposes procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
	1.5 Management of energy registration data errors for revenue billing purposes parameters are established from organisational established procedures, policies and specifications.
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work.

ELEMENT	PERFORMANCE CRITERIA
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the management of energy registration data errors for revenue billing purposes	2.1 OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures.
	2.3 Lifting, climbing, and use of powertools/equipment, techniques and practices are safely exercised according to requirements.
	2.4 Hazard warnings and safety signs are recognized and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
	2.6 Testing equipment is used in accordance with the work schedule and requirements and/or established procedures.
	2.7 Evaluation of revenue metering data and faults is carried out in accordance with the work schedule
	2.8 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|---|--|
| | 2.9 | Essential knowledge and associated skills are applied in the management of energy registration data errors for revenue billing purposes to ensure completion in an agreed timeframe according to requirements. |
| | 2.10 | Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements. |
| | 2.11 | Quality of work is monitored against personal performance agreement and/or established organisational and professional standards. |
| 3 | Complete the evaluation of revenue metering data and faults | |
| | 3.1 | Final inspections of the management of energy registration data errors for revenue billing purposes using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project. |
| | 3.2 | Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes. |
| | 3.3 | Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval. |
| | 3.4 | Approved copies of routine testing and acceptance testing procedures/activities/results, for the management of energy registration data errors for revenue billing purposes, documents are issued and records are updated in accordance with established procedures. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of the management of energy registration data errors for revenue billing purposes.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS42A Revenue billing registration data error management

Evidence shall show an understanding of the management of energy registration data errors for revenue billing purposes to an extent indicated by the following aspects:

- T1 Requires the use of different types of meter manufacturer proprietary software
- T2 Requires an understanding of common failure modes and the impact on revenue billing
- T3 Understanding of tariff structures and conditions
- T4 Understanding of customer segments and commercial and industrial load patterns
- T5 Determination of sources of alternative interval data from non-revenue metering systems for use in substitution of revenue data
- T6 Awareness and the application of 'Metering Data Substitution Estimation and Validation Procedures for Metering Types 1-7'

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that

can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated

within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Perform, on at least three (3) occasions, the evaluation of two (2) of the following revenue metering data by:	Downloading load profile data Downloading event logs Determination of error date and time (includes calculating substitution data)
B	Demonstrate, on at least three (3) occasions, the use of at least two different proprietary types of software to interpret	Alarms Meter program/software settings

	the following:	Event records Power quality records Sequence of events records
C	Perform, on at least three (3) occasion, the following:	Report writing on in depth analysis
D	Perform, on at least three (3) occasion, the evaluation and or investigation of the following:	Energy consumption data Registration data CT/VT ratio confirmations On site load comparisons Customer consumption history
E	Perform, on at least two (2) occasion, the following:	Consultation with customers or their representatives to confirm site consumption patterns and loading
F	Demonstrate, on at least one (1) occasion, the following:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a

workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual management of energy registration data errors for revenue billing purposes.
- Operational access to relevant plant, drawings, manufacture's specifications/manuals and specialised testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the management of energy registration data errors for revenue billing purposes and may include the following:

Evaluating revenue metering faults by following established procedures to obtain load profile data and event logs.

Interpreting items such as; alarms, meter program/software settings, event records, power quality records, to identify a sequence of events and make final recommendations of error, date and time and substitution data to the responsible person. Requires the use of different types of meter specific proprietary software.

The evaluation and or investigation of the energy consumption and registration data, CT/VT ratio confirmations, on site load comparisons and established customer consumption history.

In depth analysis will involve report writing.

Ad hock informal reporting to meter data providers as required.

Discretionary explanation of fault to customers in non technical terms according to procedures.

Reporting on the detection and investigation of possible revenue theft.

Evaluation may include consultation with customers or their representatives to confirm site consumption patterns and loading.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency

RANGE STATEMENT

- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Testing Units

UETTDRTS43A Commission energy/revenue metering schemes

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the commissioning of energy/revenue metering schemes. This includes isolation, inspection, monitoring, testing, adjustment, repair, refurbishment and or overhaul and functional checks of revenue metering schemes. It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures and compliance to Tariff requirements.

Application of the Unit

Application of the Unit 2)

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the

recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG076A	Install and replace low voltage current transformer metering

Prerequisite Unit(s)	4)	
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits
	UEENEEG171A	Install, set up and commission interval metering
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL15A	Respond to power systems technical enquiries and requests
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRTS37A	Perform current injection testing using phantom load
	UETTDRTS38A	Install and replace high voltage

Prerequisite Unit(s)	4)	
		metering and associated equipment
	UETTDRTS39A	Maintain compliance with national electricity market metrology practices and procedures
	UETTDRTS40A	Test and maintain energy/revenue metering schemes
	UETTDRTS41A	Install and replace complex energy/revenue metering schemes and associated equipment
	UETTDRTS42A	Management of energy registration data errors for revenue billing purposes

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the commissioning of energy/revenue metering schemes	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of energy/revenue metering schemes are reviewed and determined.</p> <p>1.2 Purpose of the commissioning of energy/revenue metering schemes is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Organisational established procedures, policies and specifications for the commissioning of energy/revenue metering schemes are obtained or established with the appropriate personnel.</p> <p>1.4 Commissioning of energy/revenue metering schemes procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.</p> <p>1.5 Commissioning parameters are established from organisational established procedures, policies and specifications.</p> <p>1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.</p> <p>1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.</p> <p>1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.</p>

ELEMENT	PERFORMANCE CRITERIA
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule.
	1.11 Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures.
2 Carry out the commissioning of energy/revenue metering schemes	2.1 OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
	2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures.
	2.3 Lifting, climbing, and use of powertools/equipment, techniques and practices are safely exercised according to requirements.
	2.4 Hazard warnings and safety signs are recognized and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
	2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
	2.6 Testing equipment is used in accordance with the work schedule and requirements and/or established procedures.
	2.7 Commissioning of energy/revenue metering schemes is carried out in accordance with the work schedule
	2.8 Technical advice is given regarding potential hazards, safety risks and control measures so that

ELEMENT	PERFORMANCE CRITERIA
3 Complete the commissioning of energy/revenue metering schemes	monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
	2.9 Essential knowledge and associated skills are applied in the safe commissioning of revenue metering schemes to ensure completion in an agreed timeframe according to requirements.
	2.10 Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements.
	2.11 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
	3.1 Final inspections of the commissioning of energy/revenue metering schemes using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project.
	3.2 Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes.
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the commissioning of energy/revenue metering schemes, documents are issued and records are updated in accordance with established procedures.	

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of commissioning of revenue metering schemes.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS43A Commissioning energy/revenue metering schemes

Evidence shall show an understanding of the commissioning of energy/revenue metering schemes to an extent indicated by the following aspects:

- T1 Commissioning techniques
- T2 Evaluation of the metering design and equipment accuracy to ensure suitability with National Electricity Market requirements
- T3 Recording nameplate details for all metering scheme components and ensuring compliance with the design accuracy class
- T4 Confirmation of instrument transformer connected ratios, polarities, burdens and voltage drops
- T5 Checking Integrity of all wiring, connections and terminalisation's
- T6 Ensure cable types and sizes selected are correct
- T7 Phase sequence and vector relationships are correct
- T8 Documentation verifying the errors of CT's and VT's
- T9 Validation of meter data to verify the metering programming parameters, display and error functions are all correct in accordance with manufacturer specifications
- T10 Verify meter programming to ensure the best possible resolution of energy data measurement and recording
- T11 Validate the interval data with the Responsible Person and/or Meter Data Provider
- T12 Confirm remote communications with the metering is established and is of sufficient quality to support reliable communications and data transfer
- T13 Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with the commissioning procedures
- T14 Requirements for the use of, isolation and tagging, manuals, system diagrams/plans and drawings
- T15 Requirements for the use of maintenance and commissioning manuals, system diagrams/plans and drawings

REQUIRED SKILLS AND KNOWLEDGE

T16 Techniques in commissioning procedures – planning, policy, testing techniques

T17 Close out requirements

T18 Requirements for the use of meter manufacturer manuals, system diagrams/plans and drawings

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries

risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination

legislation, regulations, policies and workplace procedures;
and

- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Perform, on at least three (3) occasions, the commissioning of the following metering schemes types:	Single feeder HV LV CT customer sites
B	Perform, on at least three (3) occasions, commissioning involving at least seven (7) of the following:	Isolation Inspection Monitoring Testing Adjustment Repair Refurbishment and or overhaul Functional checks of revenue metering schemes
C	Demonstrate, on at least three (3) occasion, knowledge and application of at least two different manufacturers:	Proprietary software Application programming Interrogations
D	Undertake, on at least three (3) occasion, the following:	Calculations including obtain final revenue multiplier. Validation of meter pulse multiplier

E	Demonstrate, on at least one (1) occasion, the following:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual commissioning of energy/revenue metering schemes.
- Operational access to relevant plant, drawings, manufacture's specifications/manuals and specialised testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills

described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the commissioning of energy/revenue metering schemes and may include the following:

Metering schemes including single feeder HV metering sites and LV CT customer sites.

Isolation, inspection, monitoring, testing, adjustment, repair, refurbishment and or overhaul and functional checks of revenue metering schemes.

This includes the knowledge and use of multiple proprietary software, application programming, interrogations.

Calculations including obtain final revenue multiplier.

Validation of meter pulse multiplier.

It also includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures and compliance to Tariff requirements.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards

RANGE STATEMENT

- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
 Testing Units

UETTDRTS44A Test and maintain energy/revenue metering schemes (complex)

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the testing and maintenance of energy/revenue metering schemes in complex situations. Complex metering schemes includes, summation, subtraction, generation, bulk supply, interconnector and wholesale metering installations. Testing and maintenance includes isolation, accuracy testing, inspection, monitoring, adjustment, repair or overhaul and functional checks of complex energy/revenue metering schemes.

It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures and compliance to tariff requirements.

This also includes the identification of faults with metering equipment, energy registration and revenue billing in accordance with established procedures.

Application of the Unit

Application of the Unit 2)

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic engineering computational problems
UEENEEE137A	Document and apply measures to

Prerequisite Unit(s)	4)	control OHS risks associated with electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG076A	Install and replace low voltage current transformer metering
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in electromagnetic devices and related circuits
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
	UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits

Prerequisite Unit(s)	4)	
	UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits
	UEENEEG171A	Install, set up and commission interval metering
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL15A	Respond to power systems technical enquiries and requests
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRTS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRTS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRTS37A	Perform current injection testing using phantom load
	UETTDRTS38A	Install and replace high voltage metering and associated equipment
	UETTDRTS39A	Maintain compliance with national electricity market metrology practices and procedures
	UETTDRTS40A	Test and maintain energy/revenue metering schemes
	UETTDRTS41A	Install and replace complex energy/revenue metering schemes and associated equipment
	UETTDRTS42A	Management of energy registration data errors for revenue billing purposes
	UETTDRTS43A	Commission energy/revenue

Prerequisite Unit(s) 4)

metering schemes

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills** 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the testing and maintenance of energy/revenue metering schemes (complex)	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the testing and maintenance of energy/revenue metering schemes (complex), are reviewed and determined.
	1.2 Purpose of testing and maintenance of energy/revenue metering schemes (complex) is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Organisational established procedures, policies and specifications for the testing and maintenance of energy/revenue metering schemes (complex) are obtained or established with the appropriate personnel.
	1.4 Testing and maintenance of energy/revenue metering schemes (complex) procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
	1.5 Testing and maintenance parameters are established from organisational established procedures, policies and specifications
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised

ELEMENT**PERFORMANCE CRITERIA**

- and evaluated against the work schedule.
- 1.11 Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures.
- 2 Carry out the testing and maintenance of energy/revenue metering schemes (complex)
- 2.1 OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
- 2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures.
- 2.3 Lifting, climbing, and use of powertools/equipment, techniques and practices are safely exercised according to requirements.
- 2.4 Hazard warnings and safety signs are recognized and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
- 2.6 Testing equipment is used in accordance with the work schedule and requirements and/or established procedures.
- 2.7 Routine testing and acceptance testing of the testing and maintenance of energy/revenue metering schemes (complex) is carried out in accordance with the work schedule
- 2.8 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.

ELEMENT	PERFORMANCE CRITERIA
	<p>2.9 Essential knowledge and associated skills are applied in the safe testing and maintenance of energy/revenue metering schemes (complex) to ensure completion in an agreed timeframe according to requirements.</p> <p>2.10 Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements.</p> <p>2.11 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.</p>
3 Complete the testing and maintenance of energy/revenue metering schemes (complex)	<p>3.1 Final inspections of the testing and maintenance of energy/revenue metering schemes (complex) using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project.</p> <p>3.2 Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the testing and maintenance of energy/revenue metering schemes (complex), documents are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

EQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of testing and maintenance of energy/revenue metering schemes (complex).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS44A Testing and maintenance of complex energy/revenue metering schemes

Evidence shall show an understanding of the testing and maintenance of complex energy/revenue metering schemes to an extent indicated by the following aspects:

- T1 Determining from schematics whether additional isolation is required and ensuring any current/voltage injection does not impact on related protection, control and SCADA schemes
- T2 Calculation of site overall offset errors due to applied correction factors to the scheme
- T3 Calculation of site overall errors for logical metering schemes based on test results of individual related physical metering points
- T4 Identifying any impacts of testing on market settlement/financial data and managing the data substitution requirements
- T5 Determine the requirement for temporary metering during testing to ensure market settlement data is not adversely affected
- T6 Modify and adapt test procedures to test non-standard metering schemes
- T7 Determine impacts of testing to ensure customer control, process and energy management systems are not adversely affected

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Perform, on at least three (3) occasion, the following activity:	Field injection testing which includes determining site accuracy by applying multiple specific test points to determine and correct meter accuracy to applicable standards
B	Perform, on at least three (3) occasions, the testing and maintenance of any four (4) of the following:	Summation Subtraction Generation Bulk supply Interconnector Wholesale metering installations
C	Perform, on at least three (3) occasion, the following activities:	Identification of faults with metering equipment, energy registration and revenue billing Ensuring that all connection points are in operational order Identifying and correcting y functional errors
D	Demonstrate, on at least one (1) occasion, the following:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual testing and maintenance of energy/revenue metering schemes (complex).
- Operational access to relevant plant, drawings, manufacture's specifications/manuals and specialised testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRTS10B Design Secondary Isolation Instructional

Documents

UETTDRTS524A Commission energy/revenue metering schemes

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the testing and maintenance of energy/revenue metering schemes (complex) and may include the following:

Isolation at local fuses and links and determining against standards if additional isolation is required ensuring that appropriate drawings are obtained and understood prior to and during work activities. This includes but is not limited to energy management and protection schemes.

Injection testing by applying multiple specific test points to determine and correct meter errors to applicable standards (may include, enterprise, manufacturers, Regulated Energy Market).

Working in environments of high complexity where summation, subtraction, generation, bulk supply, interconnector and wholesale metering installations occur. Ensuring that appropriate pre determined work practises are applied prior to and during the undertaking of any work activities

Identification of faults with metering equipment, energy registration and revenue billing in accordance with established procedures. Making sure that all connection points are in operational order with the ability to identify and correct any functional errors.

It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures and compliance to tariff requirements.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications

RANGE STATEMENT

- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Testing Units

UETTDRTS45A Manage compliance with national electricity market metrology practices and procedures

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the management of compliance with national electricity market metrology practice and procedures. It includes managing work functions to ensure the compliance of a Customer's Revenue metering Installation. This includes demonstrating detailed knowledge of the role and responsibilities as the representative of the Metering Provider. It also includes the establishment/maintenance of relationships with other market participants and management of compliance with organisational policies, procedures and the National Electricity Market.

Application of the Unit

Application of the Unit 2)

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be

undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG076A	Install and replace low voltage current transformer metering

Prerequisite Unit(s)	4)
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UEENEEG103A	Install low voltage wiring and accessories
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits
UEENEEG171A	Install, set up and commission interval metering
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL15A	Respond to power systems technical enquiries and requests
UETTDREL16A	Working safely near live electrical apparatus
UETTDRTS37A	Perform current injection testing using phantom load
UETTDRTS38A	Install and replace high voltage

Prerequisite Unit(s)	4)	
		metering and associated equipment
	UETTDRTS39A	Maintain compliance with national electricity market metrology practices and procedures
	UETTDRTS40A	Test and maintain energy/revenue metering schemes
	UETTDRTS41A	Install and replace complex energy/revenue metering schemes and associated equipment
	UETTDRTS42A	Management of energy registration data errors for revenue billing purposes
	UETTDRTS43A	Commission energy/revenue metering schemes

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|---|---|
| 1 Plan for the management of compliance with national electricity market metrology practices and procedures | 1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the management of compliance with national electricity market metrology practices and procedures are reviewed and determined. |
| | 1.2 Purpose of the management of compliance with national electricity market metrology practices and procedures is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel. |
| | 1.3 Organisational established procedures, policies and specifications for the management of compliance with national electricity market metrology practices and procedures are obtained or established with the appropriate personnel. |
| | 1.4 Management of compliance with national electricity market metrology practices and procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief. |
| | 1.5 Management of compliance with national electricity market metrology practices and procedures parameters are established from organisational established procedures, policies and specifications. |
| | 1.6 Equipment/tools and personal protective equipment is selected based on specified Performance Criteria and established procedures. |

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|------|--|
| | 1.7 | Work roles and tasks are allocated according to requirements and individuals' competencies. |
| | 1.8 | Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures. |
| | 1.9 | Liaison and communication issues with other/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work. |
| | 1.10 | Risk control measures are identified, prioritised and evaluated against the work schedule. |
| | 1.11 | Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures. |
| 2 | 2.1 | Carry out the management of compliance with national electricity market metrology practices and procedures
OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures. |
| | 2.2 | First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures. |
| | 2.3 | Lifting, climbing, and use of powertools/equipment, techniques and practices are safely exercised according to requirements. |
| | 2.4 | Hazard warnings and safety signs are recognized and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| | 2.5 | Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures. |
| | 2.6 | Testing equipment is used in accordance with the work schedule and requirements and/or |

ELEMENT

PERFORMANCE CRITERIA

- established procedures.
- 2.7 Routine management of compliance issue with national electricity market metrology practices & procedures is carried out in accordance with the work schedule
- 2.8 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.9 Essential knowledge and associated skills are applied in the management of compliance with national electricity market metrology practices and procedures to ensure completion in an agreed timeframe according to requirements.
- 2.10 Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements.
- 2.11 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 3 Complete the management of compliance with national electricity market metrology practices and procedures
- 3.1 Final compliance inspections with management of compliance with national electricity market metrology practices and procedures are undertaken to ensure they conform to all requirements and include all specifications and documents needed to complete the project.
- 3.2 Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.

ELEMENT

PERFORMANCE CRITERIA

- 3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the management of compliance with national electricity market metrology practices and procedures, documents are issued and records are updated in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of management of compliance with national electricity market metrology practices and procedures.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS45A Management of Revenue Metering operations within a Regulated Energy Market

Evidence shall show an understanding of the rules, regulations, policies and procedures applicable to meter service management and provision in a regulated energy market to an extent indicated by the following aspects:

T1 Standards, Codes, Rules and Regulations applicable to operation within a Regulated Energy Market

T2 Detailed knowledge of the roles and responsibilities of a Market participant (Meter Data Provider, Meter Provider or Responsible Person) operating within a Regulated Energy Market

T3 Detailed knowledge and understanding of the composition of a Meter Asset Management Plan (MAMP)

T4 Knowledge and understanding of and ability to apply the provisions of the organisations meter asset management plan

T5 Co-ordinating job activities for multiple discipline work groups

T6 Auditing for compliance within the Regulated Energy Market

T7 ISO accreditation applicable to operation within a Regulated Energy Market

T8 Compliance with the organisations Service Level Requirements within the Regulated Energy Market

T9 Management of customer, client and regulator negotiations and correspondence within a Regulated Energy Market

T10 Maintain meter data within a Regulated Energy Market

T11 Manage registration of customer metering installations within the Regulated Energy Market

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Perform, on at least one (1) occasions, any one (1) of the following activities:	Ensuring compliance to the meter assets management plan Conducting appropriate field audits on behalf r or with representative of the Regulated Energy Market.
B	Perform, on at least one (1) occasions, the following activity:	Coordination of job activities for multiple discipline work groups
C	Perform, on at least one (1) occasions, the following activity:	Managing work functions to ensure the compliance of a Customer's Revenue metering Installation
D	Perform, on at least two (2) occasion, the following activity:	Establish/maintain relationships with other market participants
E	Perform, on at least three (3) occasion, the following activity:	Management of compliance with organisational policies, procedures and the National Electricity Market requirements
F	Demonstrate, on at least one (1) occasion, the following:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual management of compliance with national electricity market metrology practices and procedures.
- Operational access to relevant plant, drawings, manufacture's specifications/manuals and specialised testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

UETTDRTS44A Test and maintain energy/revenue metering

schemes (complex)

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the management of compliance with national electricity market metrology practices and procedures and may include the following:

Management of compliance with national electricity market metrology practice and procedures.

Responsible for ensuring compliance to the meter assets management plan

Will be required to coordinate job activities for multiple discipline work groups.

Conducting appropriate field audits on behalf of/or with representative(s) of the Regulated Energy Market.

It includes managing work functions to ensure the compliance of a Customer's Revenue metering Installation.

They may be responsible for seeking exemptions to national regulations.

This includes demonstrating detailed knowledge of the role and responsibilities as the representative of the Metering Provider.

It also includes the establishment/maintenance of relationships with other market participants and management of compliance with organisational policies, procedures and the National Electricity Market.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation

RANGE STATEMENT

- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Testing Units

UETTDRTS46A Verification and certification of revenue metering/energy measurement instruments

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the evaluation and development of procedures and routines to certify the accuracy, traceability and uncertainty of measurement of metering standards and test equipment. This encompasses developing test procedures, PC controlled and software driven test sequences and includes the evaluation of test equipment capability and design of hardware interfaces. These processes must ensure compliance with Metering Industry Regulations to ensure traceability of all measurement.

Application of the Unit

Application of the Unit 2)

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License

to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG076A	Install and replace low voltage current transformer metering

Prerequisite Unit(s)	4)
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UEENEEG103A	Install low voltage wiring and accessories
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits
UEENEEG171A	Install, set up and commission interval metering
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL15A	Respond to power systems technical enquiries and requests
UETTDREL16A	Working safely near live electrical apparatus
UETTDRTS37A	Perform current injection testing using phantom load
UETTDRTS38A	Install and replace high voltage

Prerequisite Unit(s)	4)	metering and associated equipment
	UETTDRTS39A	Maintain compliance with national electricity market metrology practices and procedures
	UETTDRTS40A	Test and maintain energy/revenue metering schemes
	UETTDRTS41A	Install and replace complex energy/revenue metering schemes and associated equipment
	UETTDRTS42A	Management of energy registration data errors for revenue billing purposes
	UETTDRTS43A	Commission energy/revenue metering schemes

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the verification and certification of revenue metering/energy measurement instruments	<p>1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence verification and certification of revenue metering/energy measurement instruments are reviewed and determined.</p> <p>1.2 Purpose of the verification and certification of revenue metering/energy measurement instruments is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.</p> <p>1.3 Organisational established procedures, policies and specifications for the verification and certification of revenue metering/energy measurement instruments are obtained or established with the appropriate personnel.</p> <p>1.4 Verification and certification of revenue metering/energy measurement instruments procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.</p> <p>1.5 Verification and certification parameters are established from organisational established procedures policies and specifications.</p> <p>1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.</p> <p>1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.</p>

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|------|---|
| | 1.8 | Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures. |
| | 1.9 | Liaison and communication issues with other/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work. |
| | 1.10 | Risk control measures are identified, prioritised and evaluated against the work schedule. |
| | 1.11 | Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures. |
| 2 | 2.1 | Carry out the verification and certification of revenue metering/energy measurement instruments
OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures. |
| | 2.2 | First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures. |
| | 2.3 | Lifting, climbing, and use of powertools/equipment, techniques and practices are safely exercised according to requirements. |
| | 2.4 | Hazard warnings and safety signs are recognized and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures. |
| | 2.5 | Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures. |
| | 2.6 | Testing equipment is used in accordance with the work schedule and requirements and/or established procedures. |
| | 2.7 | Verification and certification of revenue |

ELEMENT

PERFORMANCE CRITERIA

- metering/energy measurement instruments is carried out in accordance with the work schedule
- 2.8 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.9 Essential knowledge and associated skills are applied in the safe verification and certification of revenue metering/energy measurement instruments to ensure completion in an agreed timeframe according to requirements.
- 2.10 Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements.
- 2.11 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.
- 3 Complete the verification and certification of revenue metering/energy measurement instruments
- 3.1 Final inspections of the verification and certification of revenue metering/energy measurement instruments using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project.
- 3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes.
- 3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.
- 3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the verification and certification of revenue metering/energy measurement instruments, documents are issued and records are updated in

ELEMENT

PERFORMANCE CRITERIA

accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of the verification and certification of revenue metering/energy measurement instruments.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS46A Verification and certification of revenue metering/energy

Evidence shall show an understanding of the verification and certification of revenue metering/energy measurement instruments to an extent indicated by the following aspects:

T1 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

T2 Electrical field testing and measurement encompassing:

- Measurement concepts - notion of error, accuracy, resolution, sources of measurement error and uncertainties, instrument specifications and calibration certificates, test and measuring instrument safety certification levels and their application.
- Types of field measuring instruments and their application - instrument meter movements and readouts (moving coil, moving iron and dynamometer meter movements, LCD digital and screen readouts), role of a microprocessor/controller in measuring instrument.
- Measuring low voltages and direct and alternating currents - low voltage and current measurement techniques embodied in microprocessor based instruments, causes of inaccuracies and overcoming them, test instrument set up and safety procedures, interpreting test readings.
- Measuring high voltages and direct and alternating currents - high voltage and current measurement techniques embodied in microprocessor based instruments, causes of inaccuracies and overcoming them, test instrument set up and safety procedures, interpreting test readings.

REQUIRED SKILLS AND KNOWLEDGE

- Measuring fault levels and (earth) fault loop impedance - fault and fault loop impedance measurement techniques embodied in microprocessor based instruments, causes of inaccuracies and overcoming them, test instrument set up and safety procedures, interpreting test readings.
- Measuring power, energy, reactive power, power factor and maximum demand - power measurement techniques embodied in microprocessor based instruments, causes of inaccuracies and overcoming them, test instrument set up and safety procedures, interpreting test readings.
- Measuring power quality - power measurement techniques embodied in microprocessor based instruments, causes of inaccuracies and overcoming them, test instrument set up and safety procedures, interpreting test readings (power quality measurement includes waveform distortion, harmonics, power factor and transients).

T3 Calibration techniques encompassing:

- Principles of common calibration techniques
- Purpose of Standards and calibration certification
- Minimising error during calibration - source and type of errors, techniques to minimise errors during measurements, calculating the degree of error and calibration factors
- Determining the parameters to which the device will be calibrated
- Need for normal performance check.
- Purpose of calibration documentation

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this

shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Perform, on at least three (3) occasions, the following activity:	Development and evaluation of procedures and routines to verify and certify the accuracy, traceability and uncertainty of Metering Standards and Test equipment
B	Perform, on at least one (1) occasions, the following activity:	Evaluation and implementation of procedures and practices to ensure traceability of test equipment to NATA requirements

C	Perform, on at least one (1) occasions, the following activity:	Development of test procedures for new hardware and analysis of performance against required outcomes
D	Perform, on at least one (1) occasions, the following activity:	Evaluation of test equipment capability and design of hardware interfaces
E	Demonstrate, on at least one (1) occasion, the following:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual verification and certification of revenue metering/energy measurement instruments.
- Operational access to relevant plant, drawings, manufacture’s specifications/manuals and specialised testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

**Method of
assessment** **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the verification and certification of revenue metering/energy measurement instruments and may include the following:

Development and evaluation of procedures and routines to verify and certify the accuracy, traceability and uncertainty of Metering Standards and Test equipment.

Calculation and application of uncertainty measurements to meet the requirements of the “ISO Guide to Estimation of Measurement Uncertainty”.

Evaluation and implementation of procedures and practices to ensure traceability of test equipment to NATA requirements

The development of test procedures for new hardware and analysis of performance against required outcomes.

Developing PC controlled test sequences that may include the evaluation of test equipment capability and design of hardware interfaces.

These processes must ensure compliance with Metering Industry Regulations.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention

RANGE STATEMENT

- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Testing Units

UETTDRTS47A Commission energy/revenue metering schemes (complex)

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the commissioning of energy/revenue metering schemes in complex situations including summation, subtraction, generation, bulk supply, interconnector and wholesale metering installations. This includes isolation, inspection, monitoring, testing, adjustment, repair, refurbishment and or overhaul and functional checks of complex revenue metering schemes. It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures and compliance to tariff requirements.

Application of the Unit

Application of the Unit 2)

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit requires a licence/registration to practice in the work place subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to Occupational Health and Safety, electricity/telecommunications/gas/water industry safety and compliance, industrial relations, environmental protection, anti discrimination and training. Commonwealth, State/Territory or Local Government legislation and regulations may exist that limits the age of operating certain equipment.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEED104A	Use engineering applications software on personal computers
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE124A	Compile and produce an energy sector detailed report
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits problems
UEENEEE126A	Provide solutions to basic engineering computational problems
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work

Prerequisite Unit(s)	4)
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG076A	Install and replace low voltage current transformer metering
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in electromagnetic devices and related circuits
UEENEEG103A	Install low voltage wiring and accessories
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits
UEENEEG149A	Provide engineering solutions to problems in complex polyphase

Prerequisite Unit(s)	4)	
		power circuits
	UEENEEG171A	Install, set up and commission interval metering
	UETTDREL11A	Apply sustainable energy and environmental procedures
	UETTDREL15A	Respond to power systems technical enquiries and requests
	UETTDREL16A	Working safely near live electrical apparatus
	UETTDRTS62A	Implement and monitor the power system organisational OHS policies, procedures and programs
	UETTDRTS63A	Implement and monitor the power system environmental and sustainable energy management policies and procedures
	UETTDRTS37A	Perform current injection testing using phantom load
	UETTDRTS38A	Install and replace high voltage metering and associated equipment
	UETTDRTS39A	Maintain compliance with national electricity market metrology practices and procedures
	UETTDRTS40A	Test and maintain energy/revenue metering schemes
	UETTDRTS41A	Install and replace complex energy/revenue metering schemes and associated equipment
	UETTDRTS42A	Management of energy registration data errors for revenue billing purposes
	UETTDRTS43A	Commission energy/revenue metering schemes
	UETTDRTS44A	Test and maintain energy/revenue

Prerequisite Unit(s) 4)

metering schemes (complex)

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan for the commissioning of energy/revenue metering schemes (complex)	1.1 OHS practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of energy/revenue metering schemes (complex) are reviewed and determined.
	1.2 Purpose of the commissioning of energy/revenue metering schemes (complex) is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel.
	1.3 Organisational established procedures, policies and specifications for the commissioning of energy/revenue metering schemes (complex) are obtained or established with the appropriate personnel.
	1.4 Commissioning of energy/revenue metering schemes (complex) procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief.
	1.5 Commissioning parameters are established from organisational established procedures, policies and specifications.
	1.6 Equipment/tools and personal protective equipment are selected based on specified Performance Criteria and established procedures.
	1.7 Work roles and tasks are allocated according to requirements and individuals' competencies.
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures.
	1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work.
	1.10 Risk control measures are identified, prioritised

ELEMENT**PERFORMANCE CRITERIA**

- and evaluated against the work schedule.
- 1.11 Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures.
- 2 Carry out the commissioning of energy/revenue metering schemes (complex)
- 2.1 OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures.
- 2.2 First Aid, Rescue and other related work procedures are performed according to requirements and/or established procedures.
- 2.3 Lifting, climbing, and use of powertools/equipment, techniques and practices are safely exercised according to requirements.
- 2.4 Hazard warnings and safety signs are recognized and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.
- 2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.
- 2.6 Testing equipment is used in accordance with the work schedule and requirements and/or established procedures.
- 2.7 Commissioning of energy/revenue metering schemes (complex) is carried out in accordance with the work schedule
- 2.8 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures.
- 2.9 Essential knowledge and associated skills are applied in the safe commissioning of

ELEMENT	PERFORMANCE CRITERIA
3 Complete the commissioning of energy/revenue metering schemes (complex)	<p>energy/revenue metering schemes (complex) to ensure completion in an agreed timeframe according to requirements.</p> <p>2.10 Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements.</p> <p>2.11 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards.</p> <p>3.1 Final inspections of the commissioning of energy/revenue metering schemes (complex) using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project.</p> <p>3.2 Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes.</p> <p>3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval.</p> <p>3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the commissioning of energy/revenue metering schemes (complex), documents are issued and records are updated in accordance with established procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of the commissioning of energy/revenue metering schemes (complex).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TTS47A Commissioning of complex energy/revenue metering schemes

Evidence shall show an understanding of the commissioning of complex energy/revenue metering schemes to an extent indicated by the following aspects:

- T1 Additional hardware components which add complexity and the possibility for greater uncertainty in overall accuracy
- T2 Calculations are more complex and require consideration of multiple sources of errors to accurately determine the overall site errors
- T3 Calculation and verification of correct application of transformer losses, transmission line losses and correction factors in meter programming
- T4 Determining the inputs and relationships required of physical metering points to establish and verify logical metering schemes
- T5 Consideration to all sources of burden on the metering instrument transformers and ensuring the instrument transformer is operating within its accuracy limits
- T6 Communicating with market participants, including Meter Data Provider, Responsible Person
- T7 Knowledge of high fault currents
- T8 Risk assessments and safe systems of work

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Perform, on at least three (3) occasions, the commissioning of at least seven (7) of the following complex metering scheme types:	<p>Multiple feeder HV and LV customers</p> <p>Summation</p> <p>Subtraction</p> <p>Interposing</p> <p>Voltage changeover schemes</p> <p>Generation</p> <p>Zone substation</p> <p>Bulk supply</p> <p>Interconnector</p> <p>Wholesale metering</p>
B	Perform, on at least three (3) occasions, at least six (6) of the following activities:	<p>Isolation</p> <p>Inspection</p> <p>Monitoring</p> <p>Testing</p> <p>Adjustment</p> <p>Repair</p> <p>Refurbishment and or overhaul</p> <p>Functional checks of complex revenue metering schemes.</p>
C	Perform, on at least three (3) occasions, the following activities:	<p>Ensuring meter function by the use of multiple proprietary software applications</p> <p>Determining energy flows, voltage, current and phasor relationships</p> <p>Validation against independent information sources and test results to ensure that the installation is operating</p>

		<p>within prescribed limits (enterprise, manufacturers, regulated energy market requirements)</p> <p>Validation of the actual meter energy data against Meter Data Provider remote data streams</p> <p>Calculate and record the overall installation site error and ensure compliance with regulated energy market compliance.</p> <p>Endorse the site overall accuracy and installation compliance as the technical representative authorised by the metering provider.</p> <p>Ensure all records of the commissioning of energy/revenue metering schemes (complex), are complete and forwarded to the appropriate authority in accordance with regulatory requirements.</p>
D	Demonstrate, on at least one (1) occasion, the following:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the

		above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual commissioning of energy/revenue metering schemes (complex).
- Operational access to relevant plant, drawings, manufacture's specifications/manuals and specialised testing equipment.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working in realistic environment and a variety of conditions.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competence in

this unit may be assessed concurrently with the following units:

UETTDRTS44A Test and maintain energy/revenue metering schemes (complex)

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the commissioning of energy/revenue metering schemes (complex) and may include the following:

Complex metering schemes include multiple feeder HV and LV customers, summation, subtraction, interposing, Voltage changeover schemes, Generation, Zone substation, bulk supply, interconnector and wholesale metering installations.

This includes isolation, inspection, monitoring, testing, adjustment, repair, refurbishment and or overhaul and functional checks of complex revenue metering schemes.

It also includes:

- ensuring meter function by the use of multiple proprietary software applications
- determining energy flows, voltage, current and phasor relationships
- Validation against independent information sources and test results to ensure that the installation is operating within prescribed limits (enterprise, manufacturers, regulated energy market requirements)
- Validation of the actual meter energy data against Meter Data Provider remote data streams
- Calculate and record the overall installation site error and ensure compliance with regulated energy market compliance.
- Endorse the site overall accuracy and installation compliance as the technical representative authorised by the metering provider.
- Ensure all records of the commissioning of energy/revenue metering schemes (complex), are complete and forwarded to the appropriate authority in accordance with regulatory requirements.

It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures and compliance to tariff requirements.

The following constants and variables included in the element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation

RANGE STATEMENT

- Confined space
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Testing Units

UETTDRC21A Use climbing techniques to cut vegetation above ground near live electrical apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers cutting and/or pruning vegetation above ground level (using climbing techniques) and removal of vegetation obstructions, up to the climber exclusion zone as defined for both Authorised and Instructed Persons in the industry guidelines associated with live electrical apparatus, using the established cutting plan relevant to the vegetation type. It encompasses the safe use of appropriate/specialised tools and equipment according to requirements and established procedures. It includes the utilisation of climbing techniques in conjunction with aerial emergency rescue procedures and, inspection and preparation of climbing equipment with recommendations for corrective action being referred to appropriate authorities.

It includes safely accessing trees from above ground level to install restraints/slings, removing tree limbs in a safe manner and, clearing debris from the felling site to eliminate the occurrence of electrical incidents. It DOES NOT include entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

Also included is the preparation of risk assessment control measures that encompass job safety assessment. All work and zones are in compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, industry bi-partite body – Guidelines/Codes of Practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

Application of the Unit

Application of the Unit 2)

This unit shall apply to Transmission, Distribution, Rail Traction, Telecommunications and Vegetation Management Control industry sectors.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each State and Territory for the safe planning and removal of vegetation around live powerlines up to the live work zone including near live electrical apparatus, and regulations that directly relate to Occupational Health and Safety and/or contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental

Prerequisite Unit(s)	4)	response policies and procedures
	UETTDREL14A	Working safely as a non electrical worker near live electrical apparatus
	UETTDRC23A	Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus
	UETTDRC27A	Monitor safety compliance for vegetation work near live electrical apparatus
	UETTDRC33A	Apply pruning techniques to vegetation control near live electrical apparatus
	UETTDRC34A	Undertake release and rescue from a tree near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 2 Writing 2 Numeracy 2

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to cut/prune vegetation above ground (using climbing technique) up to the vegetation exclusion zone near live electrical apparatus.	1.1 Work instructions and cutting plan are received and confirmed.
	1.2 Relevant requirements and established procedures to be followed for the work to be performed in accord with the cutting are discussed with all personnel to establish and confirm the work schedule.
	1.3 OHS policies and procedures to be followed for the work to be performed are received and confirmed.
	1.4 Suggestions to assist and/or improve meeting the cutting of vegetation above ground level outside the climber exclusion zone near electrical apparatus outcomes are made to others involved in the work.
	1.5 Hazards are identified; OHS risks associated with working near live electrical apparatus are identified and reported according to established procedures.
	1.6 Scope of responsibility under the relevant work permit(s)/access authorisation(s) identified according to requirements and established procedures with relevant personnel.
	1.7 Resources including, equipment, tools, approved platforms and personal protective equipment required for the job are obtained and, in working order according to established procedures.

ELEMENT	PERFORMANCE CRITERIA
	1.8 Relevant responsibility associated with First Aid, working aloft, and/or other related work safety procedures at the worksite are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident.
	1.9 Client issues including environmental values are identified and referred to appropriate personnel in accordance with industry/acceptable /community standards.
	1.10 Site is prepared to produce a quality outcome, follow sustainable energy principles and practices, and to minimise risk and damage to property, commerce, stock and individuals in accordance with established procedures.
	1.11 Road signs, barriers and warning devices are obtained and positioned in accordance with given instructions and requirements.
	1.12 Pre-operational checks are undertaken to confirm safe and correct operation of tools and equipment for safe use near live electrical apparatus according to requirements and established procedures.
	1.13 Work permit(s)/access authorisation(s) are confirmed and received, where applicable, for commencement of the work according to requirements and established procedures with relevant personnel.
2 Carry out the cutting/pruning of vegetation above ground (using climbing technique) up to the vegetation exclusion zone near live electrical apparatus.	2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures.
	2.2 Lifting, climbing, working aloft, and use of tools/equipment, techniques and practices are

ELEMENT	PERFORMANCE CRITERIA
	safely followed in accordance with given instructions and, according to requirements confirmed to eliminate the prospects of incidents.
2.3	Operational knowledge for the cutting of vegetation above ground level outside the climber exclusion zone near electrical apparatus is confirmed to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements and established procedures.
2.4	Cutting of vegetation above ground level outside the climber exclusion zone near electrical apparatus is carried out in accordance with the cutting plan and work schedule and, given instructions and established procedures.
2.5	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are monitored and reported/referred to the immediate authorised personnel for directions according to established procedures.
2.6	Non-routine events are referred to the immediate authorised personnel for directions according to established procedures.
2.7	Problems associated with cutting vegetation above ground level outside of the vegetation exclusion zone near electrical apparatus are attended to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met.
2.8	Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures.
3 Complete the cutting/pruning of vegetation above ground (using climbing technique) up to the vegetation	3.1 Work undertaken is checked against cutting plan and work schedule, work schedule and anomalies reported to Authorised personnel in accordance with established procedures.
	3.2 Accidents and/or incidents are actioned and

ELEMENT

PERFORMANCE CRITERIA

exclusion zone near live electrical apparatus.

reported to authorised personnel in accordance with established procedures.

3.3

Work site is rehabilitated, cleaned-up, sustainable energy principles and practices applied, and made safe in accordance with given instructions and established procedures or an agreed standard.

3.4

Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.

3.5

Appropriate personnel are notified of work completion according to established procedures.

3.6

Post-operational checks, minor maintenance and/or relevant documentation of equipment and tools/platform are conducted according to requirements.

3.7

Requirements for returning work permit(s) and/or access authorisation permits are confirmed, where applicable.

3.8

Works completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of cutting vegetation above ground outside live work zone near live electrical apparatus (climbing).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TVC21A Power line vegetation control climbing techniques

Evidence shall show an understanding of climbing techniques to cut vegetation above ground and near live electrical apparatus to an extent indicated by the following aspects:

T1 Climbing techniques encompassing:

- Commonwealth, State and local government legislation, standards, codes, supply authority regulations and or enterprise requirements including relevant certification and licensing applicable to climbing for the purpose of vegetation control
- Vegetation that are and are not permissible to climb for vegetation control
- Safety precautions which are specific to tree climbing structures for the control of vegetation - safe working practices and procedures, Occupational Health and Safety hazards and precautions, identification of OHS hazards, assessment and control of OHS risks, types, selection, maintenance, storage and use of personal protective equipment including harnesses, dangers of climbing in confined spaces and at heights, permit to work systems and isolation procedures/protocols, safe working policies, procedures and practices when climbing, emergency response and rescue including First Aid etc.
- Techniques in safe methods of controlling the descent of vegetation in an electrical environment - safety procedures including safety ropes and lines, checking and setting up equipment, load calculations/estimations, techniques in using lowering equipment, determining the serviceability of ropes and other lowering devices.
- Load charts - safe working load estimates — field formulas, branch and trunk calculations, mathematical calculations and use of technology related to loads, slings, weights, and height
- Tree climbing and pruning practices - safe climbing with ropes and harnesses, methods of ensuring operation of safety lines and ropes, roping techniques, load bearing equipment and lifts, purposes of restraints, straps, slings, bends and hitches, purposes of pulleys, maillon rapides, lowering drum, T-bar flying capstan, techniques in climbing with spikes and pole belts.
- Role of safety observer and delimitation of fall and drown zones.

T2 Enterprise specific vegetation control equipment encompassing:

- Types and application of vegetation cutting tools – chainsaws, , tool line, specialised pruning tools (cocky beaks and pruning saws)

REQUIRED SKILLS AND KNOWLEDGE

- Purpose and use of cutting plans relevant to the vegetation type
- Cutting techniques of vegetation control tools and equipment
- Techniques in undertaking different branch cuts - scarf under-cut, top cut technique, top scarf - bottom-back cut technique, side scarf opposite back-cut technique
- Pre-operational checks on vegetation control tools and equipment
- Techniques in safely using vegetation control equipment - visual inspection of vegetation control equipment, methods of using equipment at heights and in confined spaces, precautions to note during use of equipment (proximity of other personnel, proximity of powerlines and obstacles, and possible fire danger due to sparks)
- Types of personal protective equipment used in conjunction with vegetation control equipment - head protection, eye protection, hearing protection, hand protection, foot protection, body protection, general protection.
- Basic maintenance of vegetation control equipment - cleaning, proper storage, basic repair and replacement and testing for compliance to manufacturer's and OHS requirements.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full

can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and

- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Confirm operational knowledge associated with the cutting vegetation above ground outside Live Work Zone near live electrical apparatus in all of the following:	Principles of electricity, the three phase power system. Power system. Recognition of aerial voltage systems. Identification of Low Voltage Aerial Circuits. Identification of High Voltage Aerial Circuits. "Safe working zone" and "Ordinary person zone" so defined by relevant authorities. Use of technical standards, acts, regulations, codes /guidelines and established/enterprise/asset owner’s

		<p>procedures.</p> <p>System Control - Information required and function.</p> <p>Vicinity Permit - Information required and function.</p> <p>Sensitive Earth Fault (SEF) System</p> <p>Confirm environmental principals and procedures</p>
B	<p>Confirm safe practices associated with the cutting vegetation above ground outside Live Work Zone near live electrical apparatus in all of the following:</p>	<p>OHS safety practices and procedures.</p> <p>Electric shock and resuscitation.</p> <p>Release and rescue</p> <p>Role of the Safety Observer</p> <p>Events constituting an incident.</p> <p>Procedures in the event of/responding to, incidents.</p> <p>Methods of identifying hazards.</p> <p>Risk assessment procedures for both worksite and pre-job checklist.</p> <p>Selection of the best position for monitoring and controlling work (cutting)</p> <p>Selection of correct line of site to the cutter</p> <p>Correct observation of the work from ground level</p> <p>Constant analysis and decision making</p>

		relevant to the safety of the work, taking into account prevailing site conditions (lay of the land) and on-going weather conditions.
C	Confirm vegetation control associated with the cutting vegetation above ground outside Live Work Zone near live electrical apparatus in all of the following:	<p>Identify tree types</p> <p>Confirm vegetation species and types</p> <p>Confirm vegetation cutting techniques for different vegetation</p> <p>Confirm appropriate vegetation machinery and equipment to be used</p> <p>Use of feeder route plans</p>
D	Confirm the safe cutting of vegetation above ground outside Live Work Zone near live electrical apparatus in all of the following:	<p>Use of cutting plans relevant to the vegetation type.</p> <p>Safe use of all relevant personnel protective equipment</p> <p>Safe rigging and climbing procedures and techniques</p> <p>Safe operation of restraints, slings, lifting and loads</p> <p>Safe use of tools and equipment such as hand saws, chainsaws, specialised tools and equipment and or power pruners above ground.</p> <p>Safe use of chemical control and application above ground.</p> <p>Safe cutting, pruning and tree trimming</p>

		<p>techniques above ground near electrical apparatus</p> <p>Conduction of pre and post operational checks, inspection and minor maintenance.</p> <p>Safe deployment of equipment and tools in varying ground conditions and weather.</p> <p>Safe debris removal</p>
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual cutting/pruning of vegetation above ground up to the vegetation exclusion zone near live electrical apparatus using the climbing technique.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

**Method of
assessment**

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

RTF2027A

Undertake standard climbing techniques

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the cutting and/or pruning vegetation above ground level (using climbing technique) and removal of vegetation obstructions up to the climber exclusion zone as defined for both Authorised and Instructed Persons in the industry guidelines associated with live electrical apparatus.

Utilisation of climbing techniques in conjunction with aerial emergency rescue procedures and, inspection and preparation of climbing equipment with recommendations for corrective action being referred to appropriate authorities

Aerial work is conducted using regulator and/or industry approved climbing technique and includes height fall protection emergency rescue near live electrical apparatus

Use of established cutting plan(s) relevant to the vegetation type

Safety practices include: the safe use of appropriate/specialised tools and equipment, the safe use of vegetation climbing equipment and techniques and may include safely accessing trees to install restraints/slings, removing tree limbs in a safe manner, clearing debris from the felling site to eliminate the occurrence of electrical incidents and repair of risk assessment control measures that encompass job safety assessment. It also includes working safely up to the defined “ordinary person zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker/ordinary persons and risk assessment control measures that encompass job safety assessment.

Excludes entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

Work and zones is in compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body– Guidelines/Codes of Practices or other related requirements for safe work and access near live electrical and mechanical Apparatus

Excludes any work that is or may be performed by other competent operatives within the defined “live work zone”

Electricity supply infrastructure assets condition – sagging, swaying, ties, cross arms, poles, insulators, conductors, service wires, electrical apparatus/equipment, etc.

Safe approach distances zones/Safe Working Clearance

Other areas which may need to be taken into consideration are: work permit(s) and/or access authorisation permits, technical standards and Industry Guidelines, rural applications, inclement weather, ground configuration and access – undulations, uneven ground, soft ground, damp, road construction, pavements, etc, feeder route plans and the use of technology and mathematical calculations

RANGE STATEMENT

Equipment and specialised tools for use in electrical environments and loading and slinging techniques

Vegetation control includes: site rehabilitation, horticultural vegetation cutting and pruning techniques to minimise regrowth - chemicals and physical cutting and pruning tools/equipment, concerns for vegetation type/species and significance – heritage, significant, urban/rural; vegetation fire prone areas and areas of particular significance.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Vegetation Units

UETTDRVC23A Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the preparation for the controlled removal of vegetation near live electrical apparatus up to the live work zone as defined for both Authorised and Instructed Persons in the industry guidelines associated with live electrical apparatus. This includes electrical and communications conductors and cables/powerlines and associated equipment on poles and structures according to requirements and established procedures. It does not include the full gamut of rigging techniques and practices required of a Rigger or entry into to the safe approach distance (SAD) as defined for persons, mobile plant, equipment and specialised tools.

It includes the preparation of a plan for the control and removal of vegetation, specification of appropriate chemical control methods, use of slinging and loading techniques and practices to be used, traffic management, and appropriate pruning and/or cutting techniques and practices (encompasses cutting plan) for given vegetation species to minimise regrowth within the electrical field according to requirements and procedures. Also included is the preparation of risk assessment control measures that encompass job safety assessment. Encompassed is compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

Application of the Unit

Application of the Unit 2)

This competency standards unit shall apply to Transmission, Distribution, Rail Traction, Telecommunications and Vegetation Management Control industry sectors.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each State and Territory for the safe planning for the removal of vegetation around live powerlines up to the live work zone including near live electrical apparatus, and regulations that directly relate to Occupational Health and Safety and/or contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response

Prerequisite Unit(s) 4)

policies and procedures

UETTDREL14A Working safely as a non electrical worker near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 2 Writing 2 Numeracy 2

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for the development of the plan for the removal of vegetation up to vegetation exclusion zone near electrical apparatus.	1.1 Work instructions are received and confirmed.
	1.2 Relevant requirements and established procedures to be followed for the development of the work plan are discussed with all personnel to establish and confirm the work schedule.
	1.3 OHS policies and procedures to be followed for the work to be performed are received and confirmed.
	1.4 Suggestions to assist in meeting the planning for the removal of vegetation up to the live work zone near live electrical apparatus outcomes are made to others involved in the work.
	1.5 Hazards are identified, OHS risks are identified and reported according to established procedures.
	1.6 Scope of responsibility under the relevant work permit(s) /access authorisation(s) are identified and confirmed according to requirements and established procedures with relevant personnel.
	1.7 Resources including, plant, equipment, tools and personal protective equipment required for the job are identified in accordance with established procedures.
	1.8 Relevant responsibility associated with First Aid, Aerial Rescue, Tree-Top Rescue and/or other related work safety procedures at the worksite are confirmed, where appropriate, in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident.
	1.9 Client issues are identified and referred to appropriate personnel in accordance with industry/acceptable /community standards.
	1.10 Site preparation requirements are confirmed according to given instructions and planning of the work schedule for a quality outcome and to

ELEMENT

PERFORMANCE CRITERIA

- meet sustainable energy principles and practices to minimise risk and damage to property, commerce, stock, and individuals in accordance and established procedures.
- 1.11 Road signs, barriers and warning device requirements and positioning in accordance with given instructions and requirements are confirmed.
- 2 Carry out the development of the Plan for the removal of vegetation up to vegetation exclusion zone near live electrical apparatus
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are confirmed in accordance with given instructions, requirements and/or established procedures.
- 2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are confirmed in accordance with given instructions and, according to requirements confirmed to eliminate the prospects of incidents.
- 2.3 Operational knowledge for planning the removal of vegetation up to the live work zone near live electrical apparatus to be applied to the work is confirmed to ensure completion will be within an agreed timeframe and, to quality standards with a minimum of waste according to requirements and established procedures.
- 2.4 Produce plan for the removal of vegetation up to the live work zone near live electrical apparatus accordance with given instructions and established procedures.
- 2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are monitored and reported/referred to the immediate authorised personnel for directions according to established procedures.
- 2.6 Non-routine events are referred to the immediate authorised personnel for directions according to established procedures.

ELEMENT	PERFORMANCE CRITERIA
	2.7 Development of the plan is carried out in accordance with the work schedule and to requirements.
	2.8 Problems associated with producing the plan for the removal of vegetation up to the live work zone live electrical apparatus are attended to according to acquired known solutions and skills related to routine procedures to ensure the plan is produced as per instructions and established procedures.
	2.9 Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures.
3 Complete development of the plan for the removal of vegetation up to vegetation exclusion zone near electrical apparatus.	3.1 Work undertaken is checked against work schedule and anomalies reported to Authorised personnel in accordance with established procedures.
	3.2 Potential accidents and/or incidents are identified and reported to authorised personnel in accordance with established procedures.
	3.3 Work site to be rehabilitated, cleaned up and made safe is identified in accordance with given instructions and established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Appropriate personnel are notified of work completion according to established procedures.
	3.6 Works completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of planning for the removal of vegetation up to vegetation exclusion zone near live electrical apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TVC23A Vegetation control planning

Evidence shall show an understanding of planning the removal of vegetation near live electrical apparatus to an extent indicated by the following aspects:

T1 Hazard assessment and risk management appropriate to the level of responsibility in the vegetation control field encompassing:

- Identifying the terminologies associated with risk assessment - risk management, risk analysis and risk evaluation activities and eliminating or minimising risk. This incorporates principles and purposes of risk management, processes for conducting risk assessment including risk analysis and risk evaluation activities for selecting and implementing appropriate options for eliminating or minimising risk.
- Relationship risk assessment has with vegetation control
- Basic principles of hazard and risk assessment - what to look for, basic procedures in conducting work-site hazards/risk assessment, contingences, essential components of hazard assessment checks, identification of hazards associated with work function and the environment (type of equipment to be used, location of the work-site, condition of the surrounding vegetation and climate conditions)
- Techniques in the elimination or minimization of hazards/risk - identification of resources available, identification of appropriate methodology in hazard control, identification of the hierarchy of control, formulating a worksite hazard and risk assessment checklist.
- Pre-job Hazard Assessment Check (HAC) Items - JSAs, planned inspection, hazard risk assessment form, prompt sheet reference (VMP2 - electrical hazards, VMP1 – general, VMP3 - vegetation)
- Recognizing electrical hazards
- Evaluation of risk assessment and management procedures

T2 Procedures and protocols for access to powerline facilities and isolation of powerlines encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with accessing powerline facilities together with the relevant certification and licensing (if required)
- Powerline access permit procedures and documentation
- Work place signage - traffic management, unauthorised access, public protection

REQUIRED SKILLS AND KNOWLEDGE

- Powerline distribution voltages
- Switching requirements for authorised tree trimming work on high voltage overhead lines - information required by system control, information to be included on the 'vicinity permit', system control functions, authorised work adjacent to an area under an access permit, communications.
- Weather conditions at work site
- Work team communications
- Adequate light at work site

T3 Principles of tree preservation encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements associated with endangered species of
- Identifying site conditions and inspection of tree and or vegetation encompassing:
- Suitability of this type of tree in this location
- Identifying hazards, assessing and controlling risks with this tree in this location
- Inspecting location and determining work methods for tree preservation - tree defects, tree diseases, insect attacks
- Relationship to how a tree grows to vegetation control - Australian tree families
- Tree preservation - methods of clearing vegetation, tree trimming, pruning, tree felling
- Safety work measures/methods
- Prevention of soil erosion
- Regrowth control
- Disposal of debris
- Heritage, significant and urban/rural vegetation
- Fire prone areas

T4 Vegetation control using chemicals encompassing:

- Commonwealth, State and local government legislation, standards, codes, supply authority regulations and or enterprise requirements including relevant certification and licensing applicable to the control of vegetation using chemicals
- Chemical treatment principles - types and characteristics of chemical(s) to be used, regulations and procedures in handling and transporting chemicals safely, application procedures of chemicals to be used, mixing desirable quantities, pouring, spraying, and storing procedures
- Techniques in handling equipment to eliminate/reduce risks to the environment from spillages of oils, herbicides, pesticides and chemicals from such equipment as
- Methods of disposing and storage of herbicides, pesticides and chemicals
- Safety precautions specific to working with chemicals - safe working practices and procedures, Occupational Health and Safety hazards and precautions, identification of OHS hazards, assessment and control of OHS risks, types, selection, maintenance, storage and use of personal protective equipment (appropriate selection of complete or partial body protection and processes of

REQUIRED SKILLS AND KNOWLEDGE

inspection prior to use and cleaning after use), dangers of working in confined spaces and at heights while using chemicals, permit to work systems and isolation procedures/protocols

- Safe working policies, procedures and practices when using/operating specialised chemical equipment
- Emergency response and rescue, including First Aid etc
- Reasons and provisions of MSDSs
- Precautions in the use of machinery, plant, equipment and tools when working with chemicals
- Required safety techniques in the handling of herbicides - use and application of chemical agents, transporting and storage of chemicals and solvents, cleaning of equipment used in applications, procedures for spillages and contamination outside of vegetation control area.

T5 Enterprise specific — policy and procedure instructions encompassing:

- Responsibilities and duty of care of employer and employee relationship
- Methods of obtaining the up-to-date information on enterprise policy and procedures
- Rules and regulations
- Induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, housekeeping rules, emergency procedures, evacuation procedures
- Techniques when deal with others - working in teams, customer relation, complaint and issues procedures.
- Overview of enterprise professional development - fire fighting procedures, fatigue management, training and competency development - understanding and promotion

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Confirm operational knowledge associated with the planning of the removal of vegetation in all of the following:	<p>Principles of electricity, the three phase power system.</p> <p>Power system.</p> <p>Recognition of aerial voltage systems.</p> <p>Identification of Low Voltage Aerial Circuits.</p> <p>Identification of High Voltage Aerial Circuits.</p> <p>"Safe working zone" so defined by relevant authorities.</p> <p>Use of technical standards, acts, regulations, codes /guidelines and established/enterprise/asset owner's procedures.</p> <p>Confirm environmental principals and procedures.</p>
B	Confirm safe practices associated with the planning of the removal of vegetation in all of the following:	<p>OHS safety practices and procedures.</p> <p>Electric shock and resuscitation.</p> <p>Release and rescue</p> <p>Role of the Safety Observer</p> <p>Events constituting an incident.</p> <p>Procedures in the event of/responding to, incidents.</p> <p>Hierarchy and methods of identifying and controlling hazards.</p> <p>Risk assessment</p>

		<p>procedures.</p> <p>Selection of the best position for monitoring and controlling work (cutting)</p> <p>Selection of correct line of site to the cutter</p> <p>Correct observation of the work from ground level</p> <p>Constant analysis and decision making relevant to the safety of the work, taking into account prevailing site conditions (lay of the land) and on-going weather conditions.</p>
C	<p>Confirm vegetation control associated with the planning of the removal of vegetation in all of the following:</p>	<p>Identify tree types</p> <p>Confirm vegetation species and types</p> <p>Confirm vegetation cutting techniques for different vegetation</p> <p>Confirm appropriate vegetation machinery and equipment to be used</p> <p>Use of feeder route plans</p> <p>Conduct calculations related to loading and slinging.</p>
D	<p>At least one occasion</p>	<p>Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the</p>

		above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual planning for the removal of vegetation up to the vegetation exclusion zone near live electrical apparatus.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to preparation for the controlled removal of vegetation around live powerlines up to the live work zone as defined for both Instructed and Authorised Persons in the industry guidelines associated with live electrical apparatus.

Includes electrical and communications conductors and cables/powerlines and associated equipment on poles and structures according to requirements and established procedures.

Excludes the full gamut of rigging techniques and practices required of a Rigger or entry into to the safe approach distance (SAD) as defined for persons, mobile plant, equipment and specialised tools.

Includes the preparation of a plan for the control and removal of vegetation, specifying appropriate chemical control methods, using slinging and loading techniques and practices to be used, traffic management, and appropriate pruning and/or cutting techniques and practices (encompasses cutting plan) for given vegetation species to minimise regrowth within the electrical field according to requirements and procedures.

Includes the preparation of risk assessment control measures that encompass job safety assessment and compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

Working safely up to the defined “ordinary person zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker/ordinary persons and in some instances vegetation.

Risk assessment control measures that encompass job safety assessment.

Excludes any work that is or may be performed by other competent operatives within the defined “ordinary person zone”

Electricity supply infrastructure assets including electrical apparatus, electrical and communication conductors, and equipment

Safe approach distances zones/Safe Working Clearance

It may also include other areas such as: Feeder route plans, infrastructure constructions and excavations, rural applications, road construction, pavements and inclement weather

Plant, equipment and tools for use in electrical environments for vegetation control, loading and slinging equipment.

Vegetation control includes: site rehabilitation, horticultural vegetation cutting and

RANGE STATEMENT

pruning techniques to minimise regrowth - chemicals and physical cutting and pruning tools/equipment, concerns for vegetation type/species and significance – heritage, significant, urban/rural; vegetation fire prone areas and areas of particular significance.

Constants and variables included in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement.

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Vegetation Units

UETTDRVC24A Assess vegetation and recommend control measures in an ESI environment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the assessment of vegetation and in particular trees for defects and hazards prior to cutting and pruning around live powerlines up to the live work zone as defined for both Instructed and Authorised Persons in the industry guidelines associated with live electrical apparatus. The assessment is compiled and recorded in accordance with requirements and/or established procedures for defined species of vegetation and/or particular tree types.

Also included is the preparation of risk assessment control measures that encompass job safety assessment and compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for Safe work and access near live Electrical and Mechanical Apparatus.

Application of the Unit

Application of the Unit 2)

This competency standards unit shall apply to Transmission, Distribution, Rail Traction, Telecommunications and Vegetation Management Control industry sectors.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each State and Territory for the safe planning for the removal of vegetation around live powerlines up to the live work zone including near live electrical apparatus, and regulations that directly relate to Occupational Health and Safety and/or contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures
UETTDREL14A	Working safely as a non electrical worker near live electrical apparatus
UETTDRC23A	Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus
UETTDRC27A	Monitor safety compliance for vegetation work near live electrical

Prerequisite Unit(s) 4)

apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 2 Writing 2 Numeracy 2

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

<p>6) Elements describe the essential outcomes of a competency standard unit</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.</p>
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Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

<p>1 Prepare and plan to conduct assessment of vegetation and, recommend control</p>	<p>1.1 Work instructions are identified and confirmed.</p> <p>1.2 Relevant requirements and established procedures to be followed for the work to be preformed are discussed with all personnel to</p>
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ELEMENT

PERFORMANCE CRITERIA

measures for work near live electrical apparatus.

establish and confirm the work schedule.

- 1.3 OHS policies and procedures to be followed for the work to be performed are received and confirmed.
- 1.4 Recommendations to assist in meeting assessment of vegetation and recommendation of control measures for working near live electrical apparatus outcomes are made to others involved in the work.
- 1.5 Hazards are identified, OHS risks associated with working near live electrical apparatus are identified and reported according to established procedures.
- 1.6 Scope of responsibility under the relevant work permit(s)/access authorisation(s) are received and confirmed according to requirements and established procedures with relevant personnel.
- 1.7 Resources including, equipment, tools and personal protective equipment required for the job are identified and, where to be used confirmed in working order according to established procedures.
- 1.8 First Aid, Pole Top Rescue and/or other related work safety procedures at the worksite are identified in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident.
- 1.9 Client issues are identified and referred to appropriate personnel in accordance with industry/acceptable /community standards.
- 1.10 Work schedule is prepared, to produce a quality outcome, follow sustainable energy principles and practices, and to minimise risk and damage to property, commerce, stock and individuals in accordance with established procedures.
- 1.11 Road signs, barriers and warning devices are

ELEMENT	PERFORMANCE CRITERIA
	identified, where appropriate, in accordance with given instructions and requirements.
2 Conduct assessment of vegetation and, recommend control measures for work near live electrical apparatus.	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures.</p> <p>2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are identified for inclusion in the assessment report according to requirements confirmed to eliminate the prospects of incidents.</p> <p>2.3 Operational knowledge for the assessment of vegetation and recommendation of control measures for working near live electrical apparatus to be applied to the work is confirmed to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements and established procedures.</p> <p>2.4 Assessment of vegetation and in particular trees for defects is undertaken in accordance with established procedures.</p> <p>2.5 Analysis of assessment results and recommendation is made of vegetation control measures to be deployed for working near live electrical apparatus in accordance with requirements and/or established procedures.</p> <p>2.6 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are monitored and reported/referred to the immediate authorised personnel for directions according to established procedures.</p> <p>2.7 Non-routine events are responded and referred to the immediate authorised personnel for directions according to established procedures.</p> <p>2.8 Problems associated with the assessment of vegetation and the recommendation of control measures for working near live electrical</p>

ELEMENT

PERFORMANCE CRITERIA

- apparatus are attended to using acquired known solutions and skills to ensure requirements and established procedures are met.
- 2.9 Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures.
- 3 Complete the assessment of vegetation and recommend control measures for work near live electrical apparatus.
- 3.1 Work undertaken is checked against work schedule and anomalies reported to authorised personnel in accordance with established procedures.
- 3.2 Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures.
- 3.3 Work site is made safe in accordance with given instructions and established procedures.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Appropriate personnel are notified of work completion according to established procedures.
- 3.6 Works completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of assessing vegetation and recommending control measures for work near live electrical apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TVC24A ESI vegetation control assessment

Evidence shall show an understanding of assessment of vegetation and recommendation of control measures in an ESI environment to an extent indicated by the following aspects:

T1 Principles of conducting assessment of the condition and type of vegetation for the purpose of controlling its growth away from live lines encompassing:

- Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations, permit requirements and/or enterprise requirements associated with the cutting/pruning/controlling the growth of vegetation around live powerlines up to the high voltage live work zone as defined for both Instructed and Authorised Persons in the industry guidelines associated with live electrical apparatus
- Techniques in established procedures for defining species of vegetation and tree characteristics, including obvious tree defects and hazards
- Techniques in selecting the relevant and suitably appropriate vegetation removal method.
- Techniques in identifying obvious hazards and risk assessment control measures that encompass job safety assessment and compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body Guidelines/Codes of Practices or other related requirements for Safe work and access near live Electrical and Mechanical Apparatus
- Techniques in determining the appropriate safe working methods up to the defined “safe working zone” near energised electrical apparatus (including electrical powerlines) for non-electrical worker/ordinary persons
- Safety precautions working on vegetation control - safe working clearances from live line, identifying OHS hazards, assessing and controlling OHS risks, types, selection, maintenance and uses of personal protective equipment, permit to work systems and isolation procedures, safe working practices when using specialised equipment, emergency response and rescue including First Aid etc, working at heights and in confined spaces.
- Techniques in establishing the appropriate safe work methods and/or type of plant, tools and or equipment to control vegetation - the selection of the most appropriate tools such as chainsaws, mowers, saws, trimmers and or the most appropriate chemical applicator.
- Use and application of plant, tools and equipment use to control vegetation - chainsaws, mowers, saws, trimmers and chemicals.

REQUIRED SKILLS AND KNOWLEDGE

- Techniques in communicating and relaying information to other personnel
- Techniques in compiling and recording assessment data collected

T2 Enterprise specific vegetation control equipment encompassing:

- Types and application of vegetation mulching tools
- Types and application of herbicide application equipment
- Purpose and use of cutting plans relevant to the vegetation type
- Cutting techniques of vegetation control tools and equipment
- Types of personal protective equipment used in conjunction with vegetation control equipment - head protection, eye protection, hearing protection, hand protection, foot protection, body protection, general protection.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place,

access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner's performance outcome is reported in accordance with the preferred approach; namely a

- percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Confirm operational knowledge associated with the assessment of vegetation and making recommendations prior to working near live electrical apparatus, in all of the following:	Principles of electricity, the three phase power system. Power system. Recognition of aerial voltage systems. Identification of Low Voltage Aerial Circuits. Identification of High Voltage Aerial Circuits. "Safe working zone" so defined by relevant authorities. Use of technical standards, acts, regulations, codes /guidelines and established/enterprise/asset owner's procedures. System Control - Information required and function. Vicinity Permit - Information required

		<p>and function.</p> <p>Sensitive Earth Fault (SEF) System</p> <p>Confirm environmental principals and procedures</p> <p>Safe approach distances for insulated cranes and plant.</p> <p>Safe approach distances for persons and hand held tools.</p>
B	<p>Confirm safe practices associated with the assessment of vegetation and making recommendations prior to working near live electrical apparatus, in all of the following:</p>	<p>OHS safety practices and procedures.</p> <p>Electric shock and resuscitation.</p> <p>Release and rescue</p> <p>Role of the Safety Observer</p> <p>Events constituting an incident.</p> <p>Procedures in the event of/responding to, incidents.</p> <p>Methods of identifying hazards.</p> <p>Risk assessment procedures.</p> <p>Selection of the best position for monitoring and controlling work (cutting)</p> <p>Selection of correct line of site to the cutter</p> <p>Correct observation of the work from ground level</p> <p>Constant analysis and decision making relevant to the safety of the work, taking into</p>

		account prevailing site conditions (lay of the land) and on-going weather conditions
C	Confirm vegetation control associated with the assessment of vegetation and making recommendations prior to working near live electrical apparatus, in all of the following:	<p>Identify tree types</p> <p>Confirm vegetation species and types</p> <p>Confirm vegetation cutting techniques for different vegetation</p> <p>Confirm appropriate vegetation machinery and equipment to be used</p> <p>Use of feeder route plans</p> <p>Conduct calculations related to loading and slinging</p>
D	Confirm the safe assessment of vegetation and making recommendations prior to working near live electrical apparatus, in all of the following:	<p>Safe use of tools, plant and equipment.</p> <p>Safe storage, transportation and use of chemicals.</p> <p>Pre and post operational checks, inspections and minor maintenance on tools and equipment.</p> <p>Safe deployment of machinery and equipment in varying conditions and weather.</p> <p>Safe use of appropriate personal protective equipment.</p> <p>Safe cutting/pruning and tree trimming methods</p> <p>Correct advice on vegetation species, types and</p>

		<p>characteristics</p> <p>Correct advice on cutting plans relevant to the vegetation species and type</p> <p>Analysis of vegetation control measures particularly of trees for defects</p> <p>Safe assessments techniques of vegetation for defects and hazards.</p> <p>Correct recommendations for appropriate pruning and/or cutting processes to be used near live electrical apparatus</p> <p>Preparing assessment reports with appropriate recommendations for course of action.</p>
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake an assessment of vegetation and make recommendations of control measures for work near live electrical apparatus.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

RTC2016A Recognise plants

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the assessment of vegetation and in particular trees for defects and hazards prior to cutting and pruning near live electrical apparatus up to the live work zone as defined for both Authorised and Instructed Persons in the industry guidelines associated with live electrical apparatus.

The assessment is compiled and recorded in accordance with requirements and/or established procedures for established species of vegetation and/or particular tree species, types and characteristics

Also included is the preparation of risk assessment control measures that encompass job safety assessment and compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for Safe work and access near live Electrical and Mechanical Apparatus

Working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker/ordinary persons.

Risk assessment control measures that encompass job safety assessment.

Excludes any work that is or may be performed by other competent operatives within the defined “live work zone”

Electricity supply infrastructure assets condition – sagging, swaying, ties, cross arms, poles, insulators, conductors, service wires, electrical apparatus/equipment, etc.

Safe approach distances zones/Safe Working Clearance

Other areas which may need to be taken into consideration are: work permit(s) and/or access authorisation permits, technical standards and Industry Guidelines, rural applications, inclement weather, ground configuration and access – undulations, uneven ground, soft ground, damp, road construction, pavements, etc, feeder route plans and the use of technology and mathematical calculations

Equipment and specialised tools for use in electrical environments and loading and slinging techniques

Vegetation control includes: site rehabilitation, horticultural vegetation cutting and pruning techniques to minimise regrowth - chemicals and physical cutting and pruning tools/equipment, concerns for vegetation type/species and significance – heritage, significant, urban/rural; vegetation fire prone areas and areas of particular significance.

Areas of particular significance

Loading and slinging techniques

RANGE STATEMENT

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Vegetation Units

UETTDRVC25A Use elevated platform to cut vegetation above ground level near live electrical apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers cutting and/or pruning vegetation above ground level and removal of vegetation obstructions, up to the live work zone as defined for both Authorised and Instructed Persons in the industry guidelines associated with live electrical apparatus, using the established cutting plan relevant to the vegetation type. It encompasses the safe use of appropriate/specialised tools and equipment according to requirements and established procedures. It includes safely accessing trees from above ground level to install restraints/slings, removing tree limbs in a safe manner and, clearing debris from the felling site to eliminate the occurrence of electrical incidents. It DOES NOT include entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

Also included is the preparation of risk assessment control measures that encompass job safety assessment. All work and zones is in compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body– Guidelines/Codes of Practices or other related requirements for Safe work and access near live Electrical and Mechanical Apparatus.

Application of the Unit

Application of the Unit 2)

This competency standards unit shall apply to
Transmission, Distribution, Rail Traction,

Telecommunications and Vegetation Management
Control industry sectors.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each State and Territory for the safe planning and the removal of vegetation around live powerlines up to the live work zone including near live electrical apparatus, and regulations that directly relate to Occupational Health and Safety and/or contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures
UETTDREL14A	Working safely as a non electrical worker near live electrical apparatus
UETTDRC23A	Plan the removal of vegetation up to

Prerequisite Unit(s) 4)

vegetation exclusion zone near live electrical apparatus

UETTDRVC27A Monitor safety compliance for vegetation work near live electrical apparatus

UETTDRVC33A Apply pruning techniques to vegetation control near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 2 Writing 2 Numeracy 2

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to cut/prune vegetation above ground up to the vegetation exclusion zone near live electrical apparatus using an elevating platform.	1.1 Work instructions and cutting plan are received and confirmed.
	1.2 Relevant requirements and established procedures to be followed for the work to be performed in accord with the cutting are discussed with all personnel to establish and confirm the work schedule.
	1.3 OHS policies and procedures to be followed for the work to be performed are received and confirmed.
	1.4 Suggestions to assist and/or improve meeting the cutting of vegetation above ground level outside the live work zone near electrical apparatus outcomes are made to others involved in the work.
	1.5 Hazards are identified, OHS risks associated with working near live electrical apparatus are identified and reported according to established procedures.
	1.6 Scope of responsibility under the relevant work permit(s)/access authorisation(s) identified according to requirements and established procedures with relevant personnel.
	1.7 Resources including, equipment, tools, approved platforms and personal protective equipment required for the job are obtained and, in working order according to established procedures.
	1.8 Relevant responsibility associated with First Aid, working aloft, and/or other related work safety procedures at the worksite are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident.
	1.9 Client issues including environmental values are identified and referred to appropriate

ELEMENT

PERFORMANCE CRITERIA

- personnel in accordance with industry/acceptable /community standards.
- 1.10 Site is prepared to produce a quality outcome, follow sustainable energy principles and practices, and to minimise risk and damage to property, commerce, stock and individuals in accordance with established procedures.
- 1.11 Road signs, barriers and warning devices are obtained and positioned in accordance with given instructions and requirements.
- 1.12 Pre-operational checks are undertaken to confirm safe and correct operation of tools and equipment for safe use near live electrical apparatus according to requirements and established procedures.
- 1.13 Work permit(s)/access authorisation(s) are confirmed and received, where applicable, for commencement of the work according to requirements and established procedures with relevant personnel.
- 2 Carry out the cutting/pruning of vegetation above ground up to the vegetation exclusion zone near live electrical apparatus using an elevating platform.
- 2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures.
- 2.2 Lifting, climbing, working aloft, and use of tools/equipment, techniques and practices are safely followed in accordance with given instructions and, according to requirements confirmed to eliminate the prospects of incidents.
- 2.3 Operational knowledge for the cutting of vegetation above ground level outside the live work zone near electrical apparatus is confirmed to ensure completion in an agreed timeframe and, to quality standards with a

ELEMENT

PERFORMANCE CRITERIA

- minimum of waste according to requirements and established procedures.
- 2.4 Cutting of vegetation above ground level outside the live work zone near electrical apparatus using a EWP is carried out in accordance with the cutting plan and work schedule and, given instructions and established procedures.
- 2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are monitored and reported/referred to the immediate authorised personnel for directions according to established procedures.
- 2.6 Non-routine events are referred to the immediate authorised personnel for directions according to established procedures.
- 2.7 Problems associated with cutting vegetation above ground level outside of the vegetation exclusion zone near electrical apparatus are attended to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met.
- 2.8 Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures.
- 3 Complete the cutting/pruning of vegetation above ground up to the vegetation exclusion zone near live electrical apparatus using an elevating platform.
- 3.1 Work undertaken is checked against cutting plan and work schedule, work schedule and anomalies reported to Authorised personnel in accordance with established procedures.
- 3.2 Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures.
- 3.3 Work site is rehabilitated, cleaned-up, sustainable energy principles and practices applied, and made safe in accordance with given instructions and established procedures or an agreed standard.

ELEMENT

PERFORMANCE CRITERIA

- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Appropriate personnel are notified of work completion according to established procedures.
- 3.6 Post-operational checks, minor maintenance and/or relevant documentation of equipment and tools/platform are conducted according to requirements.
- 3.7 Requirements for returning work permit(s) and/or access authorisation permits are confirmed, where applicable.
- 3.8 Works completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of cutting vegetation above ground outside live work zone near live electrical apparatus (platform).

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TVC25A ESI vegetation control using EWP

Evidence shall show an understanding of the use EWP to cut vegetation above ground level near live electrical apparatus to an extent indicated by the following aspects:

T1 Techniques in operating tools and equipment from an EWP encompassing:

- Commonwealth, State and local government legislation, standards, codes, supply authority regulations and or enterprise requirements including relevant certification and licensing applicable to the operating of tools and equipment from a platform
- Types of EWP's used for vegetation control
- Advantages and disadvantages of each type of EWP
- Types of pre-operational checks on EWP's
- Electrical test requirements e.g. test and certify periodically.
- Transporting and storage methods
- Safety precautions when using EWP's
- Proper use of elevating work platforms
- Earthing of the EWP
- Proper methods of mounting and alighting platforms
- Hydraulic tools
- Use of insulated Elevating Work Platforms - insulated Elevating Work Platforms Operator
- EWP operational techniques on a platform - height safety, working aloft
- Understanding of definitions of drop zone and full zone.
- Safety precautions specific to working on platforms - safe working practices and procedures, Occupational Health and Safety hazards and precautions, identification of OHS hazards, assessment and control of OHS risks, types, selection, maintenance, storage and use of personal protective equipment including harnesses, dangers of working in confined spaces and at heights while on a platform, role of safety observer, permit to work systems and isolation procedures/protocols
- Safe working policies, procedures

T2 Enterprise specific vegetation control equipment encompassing:

- Types and application of vegetation cutting tools – chainsaws, , hydraulic pruning saws, tool line, specialised pruning tools (cocky beaks and pruning saws)

REQUIRED SKILLS AND KNOWLEDGE

- Purpose and use of cutting plans relevant to the vegetation type
- Cutting techniques of vegetation control tools and equipment
- Techniques in undertaking different branch cuts - scarf under-cut, top cut technique, top scarf - bottom-back cut technique, side scarf opposite back-cut technique
- Techniques in safe methods of controlling the descent of vegetation in an electrical environment - safety procedures including safety ropes and lines, checking and setting up equipment, load calculations/estimations, techniques in using lowering equipment, determining the serviceability of ropes and other lowering devices.
- Pre-operational checks on vegetation control tools and equipment
- Techniques in safely using vegetation control equipment - visual inspection of vegetation control equipment, methods of using equipment at heights and in confined spaces, precautions to note during use of equipment (proximity of other personnel, proximity of powerlines and obstacles, and possible fire danger due to sparks)
- Types of personal protective equipment used in conjunction with vegetation control equipment - head protection, eye protection, hearing protection, hand protection, foot protection, body protection, general protection.
- Basic maintenance of vegetation control equipment - cleaning, proper storage, basic repair and replacement and testing for compliance to manufacturer's and OHS requirements.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for

apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
- Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Confirm operational knowledge associated with the cutting vegetation above ground outside Live Work Zone near live electrical apparatus using a platform in all of the following:	Principles of electricity, the three phase power system. Power system. Recognition of aerial voltage systems. Identification of Low Voltage Aerial Circuits. Identification of High Voltage Aerial Circuits. "Safe working zone" and "Ordinary person zone" so defined by relevant authorities. Use of technical standards, acts,

		<p>regulations, codes /guidelines and established/enterprise/asset owner's procedures.</p> <p>System Control - Information required and function.</p> <p>Vicinity Permit - Information required and function.</p> <p>Sensitive Earth Fault (SEF) System</p> <p>Confirm environmental principals and procedures</p>
<p>B</p>	<p>Confirm safe practices associated with the cutting vegetation above ground outside Live Work Zone near live electrical apparatus using a platform in all of the following:</p>	<p>OHS safety practices and procedures.</p> <p>Electric shock and resuscitation.</p> <p>Release and rescue and height safety including platform aerial emergency rescue procedure</p> <p>Role of the Safety Observer</p> <p>Events constituting an incident.</p> <p>Procedures in the event of/responding to, incidents.</p> <p>Methods of identifying hazards.</p> <p>Risk assessment procedures for both worksite and pre-job checklist.</p> <p>Selection of the best position for monitoring and controlling work (cutting)</p>

		<p>Selection of correct line of site to the cutter</p> <p>Correct observation of the work from ground level</p> <p>Constant analysis and decision making relevant to the safety of the work, taking into account prevailing site conditions (lay of the land) and on-going weather conditions.</p>
C	<p>Confirm vegetation control associated with the cutting vegetation above ground outside Live Work Zone near live electrical apparatus using a platform in all of the following:</p>	<p>Identify tree types</p> <p>Confirm vegetation species and types</p> <p>Confirm vegetation cutting techniques for different vegetation</p> <p>Confirm appropriate vegetation machinery and equipment to be used</p> <p>Use of feeder route plans</p>
D	<p>Confirm the safe cutting/pruning of vegetation above ground outside Live Work Zone near live electrical apparatus using a platform in all of the following</p>	<p>Use of cutting plans relevant to the vegetation type.</p> <p>Safe use of all relevant personnel protective equipment</p> <p>Safe operation of restraints, slings, lifting and loads</p> <p>Safe use of tools and equipment such as hand saws, chainsaws, specialised tools and equipment and or power pruners above ground on a platform.</p> <p>Safe use of chemical</p>

		<p>control and application above ground on a platform.</p> <p>Safe use of regulatory and/or approved industry cutting/pruning platforms</p> <p>Safe working aloft on a platform and undertaking cutting, pruning and tree trimming techniques near electrical apparatus</p> <p>Conduction of pre and post operational checks, inspection and minor maintenance.</p> <p>Safe deployment of equipment and tools in varying ground conditions and weather.</p> <p>Safe debris removal</p>
E	At least one occasion:	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual cutting/pruning of vegetation above ground up to the vegetation exclusion zone near live electrical apparatus using platforms.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

TLILIC508A Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the cutting and/or pruning of vegetation above ground level and removal of vegetation obstructions up to the live work zone (using platform technique) as defined for both Authorised and Instructed Persons in the industry guidelines associated with live electrical apparatus.

Aerial work is conducted using regulator and/or industry approved platform(s) and includes insulated type and aerial emergency rescue near live electrical apparatus

Use of established cutting plan(s) relevant to the vegetation type

Safety practices include: the safe use of appropriate/specialised tools and equipment, the safe use of vegetation climbing equipment and techniques and may include safely accessing trees to install restraints/slings, removing tree limbs in a safe manner, clearing debris from the felling site to eliminate the occurrence of electrical incidents and repairation of risk assessment control measures that encompass job safety assessment. It also includes working safely up to the defined “ordinary person zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker/ordinary persons and risk assessment control measures that encompass job safety assessment.

Excludes entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

Work and zones is in compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body– Guidelines/Codes of Practices or other related requirements for Safe work and access near live Electrical and Mechanical Apparatus

Working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker/ordinary persons.

Excludes any work that is or may be performed by other competent operatives within the defined “live work zone”

Electricity supply infrastructure assets condition – sagging, swaying, ties, cross arms, poles, insulators, conductors, service wires, electrical apparatus/equipment, etc.

Safe approach distances zones/Safe Working Clearance

Other areas which may need to be taken into consideration are: work permit(s) and/or access authorisation permits, technical standards and Industry Guidelines, rural applications, inclement weather, ground configuration and access – undulations, uneven ground, soft ground, damp, road construction, pavements, etc, feeder route plans and the use of technology and mathematical calculations

Equipment and specialised tools for use in electrical environments and loading and slinging techniques

RANGE STATEMENT

Vegetation control includes: site rehabilitation, horticultural vegetation cutting and pruning techniques to minimise regrowth - chemicals and physical cutting and pruning tools/equipment, concerns for vegetation type/species and significance – heritage, significant, urban/rural; vegetation fire prone areas and areas of particular significance.

Safe operation and care of an Elevating Work Platform

Work permit(s) and/or access authorisation permits

Technical standards and Industry Guidelines

Loading and slinging techniques

Use of technology and mathematical calculations

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Vegetation Units

UETTDRVC26A Cut vegetation at ground level near live electrical apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers cutting and/or pruning vegetation at ground level and removal of vegetation obstructions up to the live work zone as defined for both Instructed and Authorised Persons in the industry guidelines associated with live electrical apparatus using the established cutting plan relevant to the vegetation type. It encompasses the safe use of appropriate/specialised tools and equipment according to requirements and established procedures. It includes safely accessing trees to install restraints/slings, removing small trees in a safe manner and, clearing debris from the felling site to eliminate the occurrence of electrical incidents. It DOES NOT include entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

Also included is the preparation of risk assessment control measures that encompass job safety assessment. All work is in compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body– Guidelines/Codes of Practices or other related requirements for Safe work and access near live Electrical and Mechanical Apparatus.

Application of the Unit

Application of the Unit 2)

This competency standards unit shall apply to Transmission, Distribution, Rail Traction, Telecommunications and Vegetation Management

Control industry sectors.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each State and Territory for the safe planning for the removal of vegetation around live powerlines up to the live work zone including near live electrical apparatus, and regulations that directly relate to Occupational Health and Safety and/or contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures
UETTDREL14A	Working safely as a non electrical worker near live electrical apparatus
UETTDRVC23A	Plan the removal of vegetation up to vegetation exclusion zone near live

Prerequisite Unit(s) 4)

electrical apparatus

UETTDRC27A

Monitor safety compliance for
vegetation work near live electrical
apparatus**Literacy and numeracy skills 4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 2 Writing 2 Numeracy 2

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to cut/prune vegetation at ground level up to vegetation exclusion zone near live electrical apparatus.	1.1 Work instructions and cutting plan are received and confirmed.
	1.2 Relevant requirements and established procedures to be followed for the work to be performed in accord with the cutting are discussed with all personnel to establish and confirm the work schedule.
	1.3 OHS policies and procedures to be followed for the work to be performed are received and confirmed.
	1.4 Suggestions to assist and/or improve meeting the cutting of vegetation at ground level outside of the live work zone near electrical apparatus outcomes are made to others involved in the work.
	1.5 Hazards are identified, OHS risks associated with working near live electrical apparatus are identified and reported according to established procedures.
	1.6 Scope of responsibility under the relevant work permit(s)/access authorisation(s) identified according to requirements and established procedures with relevant personnel.
	1.7 Resources including, vehicles, equipment, tools and personal protective equipment required for the job are obtained and, confirmed in working order according to established procedures.
	1.8 Relevant responsibility associated with First Aid and/or other related work safety procedures at the worksite are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident.
	1.9 Client issues including environmental values are identified and referred to appropriate personnel in accordance with industry/acceptable /community standards.

ELEMENT**PERFORMANCE CRITERIA**

- | | |
|------|---|
| 1.10 | Site is prepared to produce a quality outcome, follow sustainable energy principles and practices, and to minimise risk and damage to property, commerce, stock and individuals in accordance with established procedures. |
| 1.11 | Road signs, barriers and warning devices are obtained and positioned in accordance with given instructions and requirements. |
| 1.12 | Pre-operational checks are undertaken to confirm safe and correct operation of tools and equipment for safe use near live electrical apparatus according to requirements and established procedures. |
| 1.13 | Work permit(s)/access authorisation(s) are confirmed and received, where applicable, for commencement of the work according to requirements and established procedures with relevant personnel. |
| 2 | Carry out the cutting/pruning of vegetation at ground level up to vegetation exclusion zone near live electrical apparatus. |
| 2.1 | OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures. |
| 2.2 | Lifting, climbing, working in confined spaces, and use of tools/equipment, techniques and practices are safely followed in accordance with given instructions and, according to requirements confirmed to eliminate the prospects of incidents. |
| 2.3 | Operational knowledge for cutting vegetation species and types at ground level outside of the live work exclusion zone near electrical apparatus is confirmed to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements and established procedures. |
| 2.4 | Cutting of vegetation at ground level outside of the live work zone near electrical apparatus is carried out in accordance with the cutting plan |

ELEMENT**PERFORMANCE CRITERIA**

- and work schedule, and given instructions and established procedures.
- 2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported/referred to the immediate authorised personnel for directions according to established procedures.
- 2.6 Non-routine events are referred to the immediate authorised personnel for directions according to established procedures.
- 2.7 Problems associated with cutting vegetation at ground level outside of the vegetation exclusion zone near electrical apparatus are attended to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met.
- 2.8 Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures.
- 2.9 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures.
- 3 Complete the cutting/pruning of vegetation at ground level up to vegetation exclusion zone near live electrical apparatus.
- 3.1 Work undertaken is checked against cutting plan and work schedule, and anomalies reported to Authorised personnel in accordance with established procedures.
- 3.2 Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures.
- 3.3 Work site is rehabilitated, cleaned-up, sustainable energy principles and practices applied, and made safe in accordance with given instructions and established procedures or an agreed standard.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance

ELEMENT**PERFORMANCE CRITERIA**

with established procedures.

- 3.5 Appropriate personnel are notified of work completion according to established procedures.
- 3.6 Post-operational checks, minor maintenance and/or relevant documentation of equipment and tools are conducted according to requirements.
- 3.7 Requirements for returning work permit(s) and/or access authorisation permits are confirmed, where applicable.
- 3.8 Works completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of cutting vegetation at ground level outside 'vegetation exclusion zone' near live electrical apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TVC26A ESI vegetation control – ground level

Evidence shall show an understanding of vegetation control at ground level near live electrical apparatus to an extent indicated by the following aspects:

T1 Enterprise specific vegetation control equipment encompassing:

- Types and application of vegetation cutting tools – chainsaws, brush cutters, hydraulic pruning saws, tool line, specialised pruning tools (cocky beaks and pruning saws)
- Types and application of vegetation mulching tools
- Types and application of herbicide application equipment
- Purpose and use of cutting plans relevant to the vegetation type
- Cutting techniques of vegetation control tools and equipment
- Techniques in undertaking different branch cuts - scarf under-cut, top cut technique, top scarf - bottom-back cut technique, side scarf opposite back-cut technique
- Pre-operational checks on vegetation control tools and equipment
- Techniques in safely using vegetation control equipment - visual inspection of vegetation control equipment, methods of using equipment at heights and in confined spaces, precautions to note during use of equipment (proximity of other personnel, proximity of powerlines and obstacles, length of power lead and possible fire danger due to sparks)
- Types of personal protective equipment used in conjunction with vegetation control equipment - head protection, eye protection, hearing protection, hand protection, foot protection, body protection, general protection.
- Basic maintenance of vegetation control equipment - cleaning, proper storage, basic repair and replacement and testing for compliance to manufacturer's and OHS requirements.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Confirm operational knowledge associated with the cutting vegetation at ground level near live electrical apparatus in all of the following:	<p>Principles of electricity, the three phase power system.</p> <p>Power system.</p> <p>Recognition of aerial voltage systems.</p> <p>Identification of Low Voltage Aerial Circuits.</p> <p>Identification of High Voltage Aerial Circuits.</p> <p>"Safe working zone" and "Ordinary person zone" so defined by relevant authorities.</p> <p>Use of technical standards, acts, regulations, codes /guidelines and established/enterprise/asset owner's procedures.</p> <p>System Control - Information required and function.</p> <p>Vicinity Permit - Information required and function.</p> <p>Sensitive Earth Fault (SEF) System</p> <p>Confirm environmental principals and procedures</p>
B	Confirm safe practices associated with the cutting vegetation at ground level near live electrical apparatus in all of the following:	<p>OHS safety practices and procedures.</p> <p>Electric shock and resuscitation.</p> <p>Release and rescue</p> <p>Role of the Safety Observer</p>

		<p>Events constituting an incident.</p> <p>Procedures in the event of/responding to, incidents.</p> <p>Methods of identifying hazards.</p> <p>Risk assessment procedures for both worksite and pre-job checklist.</p> <p>Selection of the best position for monitoring and controlling work (cutting)</p> <p>Selection of correct line of site to the cutter</p> <p>Correct observation of the work from ground level</p> <p>Constant analysis and decision making relevant to the safety of the work, taking into account prevailing site conditions (lay of the land) and on-going weather conditions.</p>
C	<p>Confirm vegetation control associated with the cutting vegetation at ground near live electrical apparatus in all of the following:</p>	<p>Identify tree types</p> <p>Confirm vegetation species and types</p> <p>Confirm vegetation cutting techniques for different vegetation</p> <p>Confirm appropriate vegetation machinery and equipment to be used</p> <p>Use of feeder route plans</p>
D	<p>Confirm the safe cutting of vegetation</p>	<p>Use of cutting plans relevant to the</p>

	at ground near live electrical apparatus in all of the following:	<p>vegetation type.</p> <p>Safe use of all relevant personnel protective equipment</p> <p>Safe use of tools and equipment such as hand saws, chainsaws, specialised tools and equipment and or power pruners at ground level.</p> <p>Safe use of chemical control and application at ground level.</p> <p>Safe cutting, pruning and tree trimming techniques at ground near electrical apparatus</p> <p>Safe stump removal</p> <p>Conduction of pre and post operational checks, inspection and minor maintenance on tools and equipment.</p> <p>Safe deployment of equipment and tools in varying ground conditions and weather.</p> <p>Safe debris removal</p>
E	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual cutting of vegetation at ground level outside the ‘vegetation exclusion zone’ near live electrical apparatus

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

RTC2005A Fell small trees

RTC2706A Apply chemicals under supervision

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to cutting and/or pruning vegetation at ground level and removal of vegetation obstructions up to the live work zone as defined for both Authorised and Instructed Persons in the industry guidelines associated with live electrical apparatus.

Use of established cutting plan(s) relevant to the vegetation type

Safety practices includes; the safe use of appropriate/specialised tools and equipment and may include safely accessing trees to install restraints/slings, removing tree limbs in a safe manner, clearing debris from the felling site to eliminate the occurrence of electrical incidents and reparation of risk assessment control measures that encompass job safety assessment.

Excludes entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

Work and zones is in compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body– Guidelines/Codes of Practices or other related requirements for safe work and access near live electrical and mechanical Apparatus

Working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker/ordinary persons.

Excludes any work that is or may be performed by other competent operatives within the defined “live work zone”

Electricity supply infrastructure assets condition – sagging, swaying, ties, cross arms, poles, insulators, conductors, service wires, electrical apparatus/equipment, etc.

Infrastructure constructions and excavations

Safe approach distances zones/Safe Working Clearance

Other areas which may need to be taken into consideration are: work permit(s) and/or access authorisation permits, technical standards and Industry Guidelines, rural applications, inclement weather, ground configuration and access – undulations, uneven ground, soft ground, damp, road construction, pavements, etc, feeder route plans and the use of technology and mathematical calculations

Plant, equipment and specialised tools for use in electrical environments

Vegetation control includes: site rehabilitation, horticultural vegetation cutting and pruning techniques to minimise regrowth - chemicals and physical cutting and pruning tools/equipment, concerns for vegetation type/species and significance – heritage, significant, urban/rural; vegetation fire prone areas and areas of particular significance.

RANGE STATEMENT

Use of technology and mathematical calculations

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Vegetation Units

UETTDRVC27A Monitor safety compliance of vegetation control work in an ESI environment

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the control and monitor of work associated with vegetation control near live electrical apparatus. This includes observing, spotting, rendering warnings to stop unsafe work activities, and/or encroachment of ordinary persons, public, personnel and mobile plant and equipment into the safe approach distance (SAD) as defined for persons and mobile plant and equipment. A person designated as a Safety Observer, solely dedicated to the role, normally carries out this work.

Also included is the preparation of risk assessment control measures that encompass job safety assessment. All work and zones is in compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

Application of the Unit

Application of the Unit 2)

This competency standards unit shall apply to Transmission, Distribution, Rail Traction, Telecommunications and Vegetation Management Control industry sectors.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each State and Territory for the safe planning for the removal of vegetation around live powerlines up to the live work zone including near live electrical apparatus, and regulations that directly relate to Occupational Health and Safety and/or contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures
UETTDREL14A	Working safely as a non electrical worker near live electrical apparatus
UETTDRC23A	Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 2 Writing 2 Numeracy 2

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.
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Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|-----|---|
| 1 Prepare to control safety compliance for vegetation work near live electrical apparatus | 1.1 | Work instructions are received and confirmed. |
| | 1.2 | Relevant requirements and established procedures to be followed for the work to be performed are discussed with all personnel to establish and confirm the work schedule. |
| | 1.3 | OHS policies and procedures to be followed for |

ELEMENT

PERFORMANCE CRITERIA

- the work to be performed are received and confirmed.
- 1.4 Suggestions to assist in meeting control of safety compliance for vegetation work near live electrical apparatus outcomes are made to others involved in the work.
- 1.5 Hazards are identified, OHS risks associated with working near live electrical apparatus are identified and reported according to established procedures.
- 1.6 Scope of responsibility under the relevant work permit(s)/access authorisation(s) are received and confirmed according to requirements and established procedures with relevant personnel.
- 1.7 Resources including, equipment, tools and personal protective equipment required for the job are identified and, in working order according to established procedures.
- 1.8 Relevant responsibility associated with First Aid, Pole Top and Aerial Rescue and/or other related work safety procedures at the worksite are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident.
- 1.9 Client issues are identified and referred to appropriate personnel in accordance with industry/acceptable /community standards.
- 1.10 Site preparation is in accord with given instructions and established procedures.
- 1.11 Work schedule is prepared, to produce a quality outcome, follow sustainable energy principles and practices, and to minimise risk and damage to property, commerce, stock and individuals in accordance with established procedures.
- 1.12 Road signs, barriers and warning devices are planned and positioned in accordance with given instructions, established procedures and requirements.

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|--|-----|---|
| 2 | Carry out the control of safety compliance for vegetation work near live electrical apparatus. | 2.1 | OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste/energy are followed in accordance with given instructions, requirements and/or established procedures. |
| | | 2.2 | Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are observed in accordance with given instructions and, according to requirements to eliminate the prospects of incidents. |
| | | 2.3 | Operational knowledge for controlling the safety compliance for vegetation work near live electrical apparatus is applied to the work to ensure safe systems of work are observed and completion is in an agreed timeframe and, to quality standards. |
| | | 2.4 | Safety compliance is controlled and monitored for vegetation work near live electrical apparatus in accordance with given instructions, requirements and established procedures. |
| | | 2.5 | Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported/referred to the immediate authorised personnel for directions according to established procedures. |
| | | 2.6 | Non-routine events are responded and referred to the immediate authorised personnel for directions according to established procedures. |
| | | 2.7 | Work is performed in accordance with the work schedule and to requirements. |
| | | 2.8 | Problems associated with the control of safety compliance and monitoring for vegetation work near live electrical apparatus is responded to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met. |
| | | 2.9 | Ongoing checks of quality of the work are undertaken in accordance with given instructions |

ELEMENT

PERFORMANCE CRITERIA

- and established procedures.
- 3 Complete the control of safety compliance for vegetation work near live electrical apparatus.
- 3.1 Work undertaken is checked against work schedule and anomalies reported to authorised personnel in accordance with established procedures.
- 3.2 Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures.
- 3.3 Work site is rehabilitated, cleaned-up, sustainable energy principles and practices applied, and made safe in accordance with given instructions and established procedures or an agreed standard.
- 3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.5 Appropriate personnel are notified of work completion according to established procedures.
- 3.6 Requirements for returning work permit(s) and/or access authorisation permits are confirmed.
- 3.7 Works completion records, report forms/data sheets are completed accurately in accordance with given instructions and established procedures within.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of monitoring safety compliance for vegetation work near live electrical apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TVC27A ESI vegetation control safety compliance monitoring

Evidence shall show an understanding of safety compliance monitoring of vegetation control work in an ESI environment to an extent indicated by the following aspects:

T1 Responsibilities of a safety observer encompassing:

- Commonwealth, State and local government legislation, standards, codes, supply authority regulations and or enterprise requirements including relevant certification and licensing applicable to the duties and responsibilities of a safety observer
- Areas of responsibility such as:
 - Covering understanding of their responsibilities and
 - The responsibilities of others at the site.
 - Importance of not getting involved in anything else.
- Protocols and procedures as per enterprise specific.
- Emergency response and rescue including First Aid etc
- Enterprise specific duties of a safety observer to observe.
- Techniques in observing others in the safe performance of their work
 - Understanding of the work to be undertaken.
- Safe Approach Distances for:
 - Vehicles
 - Plant/equipment
 - People
 - Hand held tools
 - Vegetation
- Special Limits of Approach for Authorised Persons Only
- Proximity to Electrical and Telecommunications Apparatus

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	Confirm operational knowledge associated with the monitoring safety compliance for vegetation work near live electrical apparatus in all of the following:	<p>Principles of electricity, the three phase power system.</p> <p>Power system.</p> <p>Recognition of aerial voltage systems.</p> <p>Identification of Low Voltage Aerial Circuits.</p> <p>Identification of High Voltage Aerial Circuits.</p> <p>"Safe working zone" and "Ordinary person zone" so defined by relevant authorities.</p> <p>Use of technical standards, acts, regulations, codes /guidelines and established/enterprise/asset owner's procedures.</p> <p>Switching requirements for Authorised tree trimming work on voltage overhead lines.</p> <p>System Control - Information required and function.</p> <p>Vicinity Permit - Information required and function.</p> <p>Sensitive Earth Fault (SEF) System</p> <p>Confirm environmental principals and procedures</p>
B	Confirm safe practices associated with the monitoring	<p>OHS safety practices and procedures.</p> <p>Electric shock and</p>

	<p>safety compliance for vegetation work near live electrical apparatus in all of the following:</p>	<p>resuscitation. Release and rescue Role of the Safety Observer Events constituting an incident. Procedures in the event of/responding to, incidents. Selection of the best position for monitoring and controlling work (cutting) Selection of correct line of site to the cutter Correct observation of the work from ground level Constant analysis and decision making relevant to the safety of the work, taking into account prevailing site conditions (lay of the land) and on-going weather conditions</p>
C	<p>Confirm hazards and risk assessment procedures associated with the monitoring safety compliance for vegetation work near live electrical apparatus in all of the following:</p>	<p>Identifying hazards. Risk assessment procedures. Conducting work site hazard assessment Essential components of hazards assessment checks. Pre-job Hazard Assessment Check (HAC) Items Worksite hazard and risk assessment checklist Procedure for planned</p>

		inspection
D	Confirm vegetation control associated with the monitoring safety compliance for vegetation work near live electrical apparatus in all of the following:	Identify tree types Confirm vegetation species and types Confirm vegetation cutting techniques for different vegetation Confirm appropriate vegetation machinery and equipment to be used Use of feeder route plans Conduct calculations related to loading and slinging
E	All of the following:	Duties of Safety Observer's at the work site
F	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to safely undertake actual monitoring of safety compliance for vegetation work near live electrical apparatus.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to monitoring and controlling vegetation work near live electrical apparatus and/or including the following:

Voltages exceeding 240 V, 11/22/33 and/or 66 KV

Includes observing, spotting, rendering warnings to stop unsafe work activities, and/or encroachment of ordinary persons, public, personnel and mobile plant and equipment into the safe approach distance (SAD) as defined for persons and mobile plant and equipment. A person designated as a Safety Observer, solely dedicated to the role, normally carries out this work.

Work and zones is in compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for Safe work and access near live Electrical and Mechanical Apparatus.

Working safely up to the defined “ordinary person zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker/ordinary persons.

Risk assessment control measures that encompass job safety assessment.

Excludes any work that is or may be performed by other competent operatives within the defined “live work zone”

Electricity supply infrastructure assets and infrastructure constructions and excavations

Safe approach distances zones/Safe Working Clearance

It may also include other areas such as: Feeder route plans, infrastructure constructions and excavations, rural applications, road construction, pavements and inclement weather

Ground configuration – undulations, uneven ground, soft ground, damp, etc

Plant, machinery, equipment and tools for use in electrical environments

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment

RANGE STATEMENT

- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Vegetation Units

UETTDRVC29A Control vegetation whilst performing linework

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the control of vegetation including tree trimming in accordance with enterprise practices with relevant and complimentary linework competencies. It includes working near live low voltage conductors, as specified in the relevant State/Territory legislation and the completion of inspection reports and the updating of records to enterprise requirements.

Application of the Unit

Application of the Unit 2)

This competency standards unit shall apply to Transmission, Distribution, Rail Traction, Telecommunications and Vegetation Management Control industry sectors.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each State and Territory for the safe planning for the removal of vegetation around live powerlines up to the live work zone including near live electrical apparatus, and regulations that directly relate to Occupational Health and Safety and/or contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. Circuits
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL12A	Operate plant and equipment near live electrical conductors and apparatus
UETTDREL16A	Working safely near live electrical apparatus

Prerequisite Unit(s) 4)

UETTDRCIS52A	Install and maintain poles, structures and associated hardware
UETTDRCIS54A	Install and maintain poles, structures, overhead conductors and cables

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to control vegetation	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are received, analysed and confirmed, if necessary, by site inspection.</p> <p>1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites.</p> <p>1.3 OHS policies and procedures related to requirements and established procedures for the control of vegetation near live low voltage conductors are obtained and confirmed for the purposes of the work to be performed and communicated.</p> <p>1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures.</p> <p>1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear according to established procedures.</p> <p>1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures.</p> <p>1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are obtained and confirmed in working order.</p> <p>1.8 Relevant personnel at worksite are confirmed current in First Aid, Pole Top Rescue and other related work procedures according to requirements.</p> <p>1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary.</p>

ELEMENT	PERFORMANCE CRITERIA
	<p>1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.</p> <p>1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures.</p> <p>1.12 Road signs, barriers and warning devices are positioned in accordance with requirements.</p>
2 Carry out vegetation control	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures.</p> <p>2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed.</p> <p>2.3 Essential knowledge and associated skills for the safe control of vegetation near live low voltage conductors are applied to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.4 Vegetation control is carried out, in accordance with the work schedule and requirements/established procedures.</p> <p>2.5 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.6 Unplanned events in vegetation control are undertaken within the scope of established procedures.</p> <p>2.7 Known solutions to a variety of problems are applied using acquired essential knowledge and</p>

ELEMENT	PERFORMANCE CRITERIA
	associated skills.
	2.8 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures.
3 Complete vegetation control	3.1 Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures.
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable.
	3.3 Work site is rehabilitated, cleaned up and made safe in accordance with established procedures.
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
	3.5 Relevant work permit(s) are signed off and, the site is returned to service in accordance with requirements.
	3.6 Works completion records, reports, as installed /modified drawing and/or documentation and information are finalised and processed and appropriate personnel notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of controlling vegetation (linework.)

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TVC29A Ecological principles for vegetation control

Evidence shall show an understanding of ecological principles for vegetation control to an extent indicated by the following aspects:

T1 Ecological principles encompassing:

- Interdependence of plants, animals, the soil and the environment
- Environment
- Habitats
- The food chain

T2 Soil and erosion control principles encompassing:

- Soil types
- Simple tests
- Types of erosion
- Theory of erosion prevention and control
- Land degradation control
- Functions of trees in the environment

T3 Basic anatomy and physiology encompassing:

- Plant morphology
- Internal anatomy
- Growth patterns and habits
- Simple physiology

T4 Tree hazard assessment encompassing:

- Symptoms of stress in trees
- Diagnosing tree problems
- Assessments for line clearance
- Personal hazards
- The tree's response to wounding and decay
- Theory of compartmentalisation
- Tree stability (damage to root systems due to excavation)
- Principles of pruning
- Branch collars

REQUIRED SKILLS AND KNOWLEDGE

KS02-TVC29A Vegetation control techniques

Evidence shall show an understanding of the control of vegetation to an extent indicated by the following aspects:

T1 Standards, codes, legislation, supply authority regulations and or enterprise requirements including relevant certification and licensing applicable to the control of vegetation encompassing:

- Clearance zones and approach distances from overhead power lines
- Legislation associated with easement access and maintenance
- Appropriate personal protection equipment
- Equipment maintenance and safety precautions

T2 Tree climbing and pruning encompassing:

- Chainsaw safety and maintenance
- Basic cross-cutting techniques
- Simple felling
- Use of EWPs
- Safe climbing with ropes and harnesses
- Use of chainsaws in the tree
- Cutting techniques
- Roping techniques
- Chemical control of foliage and the required safety techniques
- Practical work on site with a range of trees

T3 Easement management encompassing:

- Legislation relating to easement access and maintenance
- Use of chemicals and herbicides and provision of MSDSs for those substances
- Use of machinery and plant
- Access tracks

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be	Item List

	demonstrated	
A	At least one of the following:	Non conductive ladder EWP Ground level
B	At least two of the following:	Hand clearing Specialised tools and equipment Machinery assisted clearing Herbicidal clearing
C	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual control of vegetation.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

**Method of
assessment****9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units****9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the control of vegetation including tree trimming with relevant and complimentary linework competencies and includes working near live low voltage conductors, as specified in the relevant State/Territory legislation.

Vegetation control measures may include hand clearing, growth retardants, machinery-assisted clearing and herbicidal clearing.

Work may be conducted from a ladder, an elevating work platform, a tree or on the ground under minimal supervision.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices

RANGE STATEMENT

- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Vegetation Units

UETTDRVC30A Coordinate vegetation control operations

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the coordination and implementation of continuous vegetation control and takes into account, arboreal regeneration, environmental issues and liaison and consultation procedures with, appropriate government agencies, property owners and environmental groups. It also encompasses conducting and/or contributing to public education processes and legislation issues.

Application of the Unit

Application of the Unit 2)

This competency standards unit shall apply to Transmission, Distribution, Rail Traction, Telecommunications and Vegetation Management Control industry sectors.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each State and Territory for the safe planning for the removal of vegetation around live powerlines up to the live work zone including near live electrical apparatus, and regulations that directly relate to Occupational Health and Safety and/or contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL11A	Apply sustainable energy and environmental procedures
UETTDREL16A	Working safely near live electrical apparatus
UETTDRI62A	Implement and monitor the organisation's OHS policies, programs and procedures
UETTDRI63A	Implement and monitor sustainable and environmental energy management policies and procedures

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare/plan to coordinate vegetation control work	<p>1.1 Works schedule(s), including drawings, plans, requirements, established procedures, and material lists, are obtained, analysed, if necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination.</p> <p>1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures.</p> <p>1.3 Risk control measures are identified, prioritised and evaluated against the work schedule.</p> <p>1.4 Relevant requirements and established procedures for the work are to all personnel and identified for all work sites.</p>

ELEMENT**PERFORMANCE CRITERIA**

- 1.5 Hazards are identified, OHS risks assessed and control measures are prioritised, implemented and monitored including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures.
- 1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures.
- 1.7 Resources including personnel, equipment, tools and personal protective equipment required for the job are identified, scheduled and coordinated and confirmed in a safe and technical working order.
- 1.8 Clients/Customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements.
- 1.9 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work.
- 1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures.
- 1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures.
- 1.12 Positioning of road signs, barriers and warning devices is planned in accordance with requirements.

ELEMENT	PERFORMANCE CRITERIA
2 Carry out the coordination of vegetation control work	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures.</p> <p>2.2 First Aid, Pole Top Rescue and other related work procedures are performed according to requirements and/or established procedures.</p> <p>2.3 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements.</p> <p>2.4 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures.</p> <p>2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures.</p> <p>2.6 Coordination of vegetation control work is carried out, in accordance with the work schedule and requirements and/or established procedures.</p> <p>2.7 Essential knowledge and associated skills are applied in the safe coordination of vegetation control work to ensure completion in an agreed timeframe and, to quality standards with a minimum of waste according to requirements.</p> <p>2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements.</p> <p>2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard.</p>

ELEMENT	PERFORMANCE CRITERIA
3 Complete the coordination of vegetation control work	<p>3.1 Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures.</p> <p>3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures.</p> <p>3.3 Work site is rehabilitated, cleaned up and confirmed safe in accordance with established procedures.</p> <p>3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.</p> <p>3.5 Relevant work permit(s) are signed off and are returned to service and advised to client/customer in accordance with requirements.</p> <p>3.6 Works completion records, reports, as installed /modified drawing(s) and/or documentation and information are confirmed, processed and appropriate personnel notified.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of coordinating vegetation control work.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TVC30A ESI vegetation control operation coordination

Evidence shall show an understanding of vegetation control operations coordination to an extent indicated by the following aspects:

T1 Principles of high voltage encompassing:

- Commonwealth/State/Territory legislation, Standards, codes, Commonwealth/State/Territory legislation, supply authority regulations and or enterprise requirements associated with working on or near High Voltage
- Electrical and electrostatic principles related to high voltage lines - relationship of current, voltage and resistance as related to transmission lines, relationship of phase voltage and respective line voltages.
- Production of an electric field – units, effect of distance, potential of an object within the field and the effect of distances to the potential.
- HV insulators - construction of a disc insulator, construction of a polymeric insulator, effects of an electrical field on disc insulators, identification of the number of disc insulators needed for a single line voltage, performance of a failed disc insulator on the line and the system.
- Determining the minimum allowable number of discs per string for each line voltage in the system before bare-hand work is to proceed
- Techniques in detecting a failed disc in a string
- Techniques in using appropriate tools and equipment to test a string
- Methods of recording data
- Effects of electrostatic induction on the human body - relationship of the resistance of a human body to different levels of current and voltage, relationship of a human body to an electric field, effects of electrostatic induction on bare-hand work.
- Application of Faraday's cage - effects of a body, advantages, description of the Faraday's cage used by bare-hand live-line workers
- Safety precautions working on or near High Voltage electrical apparatus - safe approach distances from live line, identification of OHS hazards, assessing and controlling risks, types, selection, maintenance, storage and uses of personnel protective equipment, permit to work systems and isolation procedures.
- Types and function of specialised live working equipment
- Safe working policies, procedures and practices when using and operating specialised equipment

REQUIRED SKILLS AND KNOWLEDGE

- Methods of using specialised equipment
- Emergency response and rescue including First Aid etc
- Effects of lighting and switching surges on performance off string insulators - health effects to workers.
- Methods used to alleviate surges on transmission lines
- Magnetic field - difference between magnetic fields and electrostatic fields, source of magnetic field, techniques in locating, measuring and analysing known sources of magnetic fields, reasons for monitoring magnetic field exposure, techniques used to monitor magnetic fields.

T2 Ecological principles for vegetation control encompassing:

- Ecological principles - interdependence of plants, animals, the soil and the environment, environment, habitats, the food chain.
- Soil and erosion control principles - soil types, simple tests, types of erosion, theory of erosion prevention and control, land degradation control, functions of trees in the environment.
- Basic anatomy and physiology - plant morphology, internal anatomy, growth patterns and habits, simple physiology.
- Tree hazard assessment encompassing: - symptoms of stress in trees, diagnosing tree problems, assessments for line clearance, personal hazards, the tree's response to wounding and decay, theory of compartmentalization, tree stability (damage to root systems due to excavation)
- Principles of pruning
- Branch collars

T3 Control of vegetation encompassing:

- Standards, codes, legislation, supply authority regulations and or enterprise requirements including relevant certification and licensing applicable to the control of vegetation - clearance zones and approach distances from overhead power lines, legislation associated with easement access and maintenance, appropriate personal protection equipment, equipment maintenance and safety precautions.
- Tree climbing and pruning - chainsaw safety and maintenance, basic cross-cutting techniques, simple felling, use of EWPs, safe climbing with ropes and harnesses, use of chainsaws in the tree, cutting techniques, roping techniques, chemical control of foliage and the required safety techniques, practical work on site with a range of trees.
- Easement management - legislation relating to easement access and maintenance, use of chemicals and herbicides and provision of MSDSs for those substances, use of machinery and plant, access tracks.

T4 Working safely up to the defined "safe working zone" near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker encompassing:

- Standards, guidelines/codes of practice, State/Territory/local government legislation, supply authority regulations and or enterprise requirements including

REQUIRED SKILLS AND KNOWLEDGE

relevant certification and licensing, applicable to working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker

- Definitions of terminologies - ‘safe working zone’ ‘risk assessment’, ‘safe approach distances zones’, ‘safe working distances’, ‘work permits’, ‘access authorisation permits’, ‘Technical standards’ ‘isolation procedures’ and ‘compliance requirements’
- OHS policies and procedures for working safely - emergency response and First Aid procedures such as CPR, roles and responsibilities of employers, employees and other parties under OHS legislation, personal protective equipment, identifying hazards, assessing and controlling OHS risks, first aid procedures, duties of a safety observer, working at heights/confined spaces, permit to work systems and isolation procedures, safe application of different types of tools and equipment, operation of mobile plant and machinery (e.g. EWP) near live electrical apparatus.
- Electricity supply infrastructure assets and voltages
- Techniques and precautions in undertaking different work functions and working safely up to the defined “safe working zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker - work functions that may be performed include, vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely near live electrical apparatus by a non-electrical worker.

T5 Co-ordination of vegetation control inspection programs encompassing:

- Commonwealth/State/Territory/local government legislation/regulations, Standards, codes, supply authority regulations and or enterprise requirements including relevant certification and licensing applicable to co-ordinating the inspection of vegetation control: - clearance zones and approach distances from overhead power lines, legislation associated with easement access and maintenance, use and operation of plant and equipment such as ‘EWPs, chainsaws/pole saws, stump grinders.
- Appropriate personal protection equipment
- Equipment maintenance and safety precautions
- Endangered plants/animals/insects
- Soil erosion
- Chemical treatment
- Provision of manufacturers and suppliers information such as material safety data sheets (MSDSs)
- Traffic management control plan
- Alternative engineering solutions for vegetation management
- Emergency response and First Aid procedures
- Techniques in the inspection of vegetation to determine action required - diagnosing tree problems and systems of stress in trees, identification of fall zone, identification of OHS hazards, assessing and controlling risks, safety policies,

REQUIRED SKILLS AND KNOWLEDGE

procedures and precautions, responsibilities and protocols for team members, procedures for obtaining electrical access authorities, procedures for coordination of operations.

- Techniques in determining the resources required for a particular vegetation control project
- Techniques in determining the condition of the tools and equipment needed for a particular vegetation control project
- Techniques in determining the duration and cost of the vegetation control project
- Techniques in relaying information to team members - safe precautions and procedures, clearances zones and approach distances, proper selection, maintenance, use and storage of personal protective equipment, procedures regarding safe use of equipment including pre-operational checks for serviceability, procedures in the safe transporting, use, storage and disposal of chemicals.
- Procedures for removal of vegetation
- Techniques in record keeping of data.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord

with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as

- specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	At least three of the following;	Hand clearing Machinery assisted clearing Growth retardants Fire clearing, Herbicidal clearing
B	At least two of the following:	Ladder EWP Tree Ground
C	All of the following;	Personnel aspects Material aspects Financial aspects
D	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and

		associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual coordination of vegetation control.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment **9.4)**

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the coordination of vegetation control work and may include the following:

Coordinating vegetation control measures which may include hand clearing, growth retardants, machinery-assisted clearing and herbicidal clearing.

Coordinating work, which may be conducted from a ladder, an elevating work platform, a tree or on the ground under minimal supervision.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Diagnostic, testing and restoration
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work

RANGE STATEMENT

- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**
Vegetation Units

UETTDRVC31A Operate specialist equipment at ground level near live electrical apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the operation and routine maintenance of specialised plant and equipment at ground level near live electrical apparatus. Including the requirement of carrying out pre-operational checks, calibrate equipment, report faults and maintain operational records and an awareness of workplace safety and positive environmental practices associated with specialised plant and equipment operation. It also includes traffic control measures and compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for safe use of equipment near live electrical and mechanical apparatus.

Application of the Unit

Application of the Unit 2)

This competency standards unit shall apply to Transmission, Distribution, Rail Traction, Telecommunications and Vegetation Management Control industry sectors.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may only

License to practice

3)

be practiced under the regulations pertaining to each State and Territory for the safe planning for the removal of vegetation around live powerlines up to the live work zone including near live electrical apparatus, and regulations that directly relate to Occupational Health and Safety and/or contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures
UETTDREL14A	Working safely as a non electrical worker near live electrical apparatus
UETTDRC31A	Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus
UETTDRC37A	Monitor safety compliance for vegetation work near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 2 Writing 2 Numeracy 2

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|---|--|
| 1 Prepare to operate and conduct routine maintenance of specialised plant and equipment near live electrical apparatus. | 1.1 Specialised plant and equipment is selected appropriate to job requirements and confirmed against a work instructions.. |
| | 1.2 Routine pre-operational checks of machinery and equipment are carried out to manufacturer’s specifications for safe use near live electrical apparatus according to requirements and |

ELEMENT	PERFORMANCE CRITERIA
	established procedures.
	1.3 Plant and/or equipment is securely attached and/or calibrated for operation to manufacturer's specifications.
	1.4 Faulty plant and equipment is identified, safety tagged, and reported to supervisor according to enterprise requirements.
	1.5 OHS hazards in the workplace are identified, risk assessed and reported according to enterprise requirements.
2 Operate specialised plant and equipment near live electrical apparatus.	2.1 Specialised plant and equipment is operated in a safe and controlled manner, and monitored for performance and efficiency.
	2.2 Risks to self, others and the environment are recognised and minimised according to enterprise and OHS requirements.
	2.3 Suitable personal protective clothing and equipment is selected, used, maintained and stored according to OHS requirements.
	2.4 Environmental implications associated with plant and equipment operation are identified, assessed and reported to the supervisor.
3 Complete the operation and routine maintenance of ground level specialised plant and equipment near live electrical apparatus.	3.1 Plant and equipment shut-down procedures are carried out to manufacturer's specifications and enterprise requirements.
	3.2 Plant and equipment operational records are maintained according to enterprise requirements.
	3.3 Plant and equipment damage, malfunctions or irregular performance are recorded and/or reported according to enterprise requirements.
	3.4 Post-operational checks, minor maintenance and/or relevant documentation of plant and equipment are conducted according to requirements.

ELEMENT

PERFORMANCE CRITERIA

- 3.5 Appropriate personnel are notified of work completion according to established procedures.
- 3.6 Plant and equipment is cleaned, secured and stored according to manufacturer's specifications and enterprise requirements.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of operating vegetation control specialised plant, and equipment near live electrical apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TVC31A ESI vegetation control specialist equipment

Evidence shall show an understanding of operating specialist equipment at ground level near live electrical apparatus to an extent indicated by the following aspects:

T1 Enterprise specific vegetation control equipment encompassing:

- Safety policies, procedures and precautions with regards to using, transporting and storage of specialised plant and machinery
- Legislation, Standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised plant and machinery
- Characteristics, capabilities and application of specialised plant and machinery for a particular job
- Types and application of vegetation cutting tools – chainsaws, brush cutters, hydraulic pruning saws, tool line, specialised pruning tools (cocky beaks and pruning saws)
- Types, selection and application of vegetation mulching tools and specialist equipment.
- Types and application of herbicide application equipment
- Purpose and use of cutting plans relevant to the vegetation type
- Cutting techniques of vegetation control tools and specialist equipment
- Techniques in undertaking different branch cuts - scarf under-cut, top cut technique, top scarf - bottom-back cut technique, side scarf opposite back-cut technique
- Pre-operational checks on vegetation control tools and equipment
- Techniques in safely using vegetation control specialist equipment - visual inspection of vegetation control equipment, methods of using equipment at heights and in confined spaces, precautions to note during use of equipment (proximity of other personnel, proximity of powerlines and obstacles, length of power lead and possible fire danger due to sparks)
- Types of personal protective equipment used in conjunction with vegetation control equipment - head protection, eye protection, hearing protection, hand protection, foot protection, body protection, general protection.
- Basic maintenance of vegetation control equipment - cleaning, proper storage, basic repair and replacement and testing for compliance to manufacturer's and OHS requirements.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment

instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment;
 - and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
 - Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	<p>Confirm the range of specialised plant and equipment is applicable to this standard in at least 3 of the following:</p> <p>(This should be: Confirm the use of at least 3 of the following)</p>	<p>Chippers. Stump grinders Brush cutters. Slashers/Tritters. Power pruners. Chemical control applicators. *Pre and post operational checks, inspections and minor maintenance. *Safe deployment of machinery and equipment in varying conditions and weather. (* Must do)</p>
B	<p>Confirm what is involved in routine pre-operational checks of specialised plant and equipment.</p> <p>(This should be: Confirm all of the following)</p>	<p>Pre-start and safety checks as per manufactures specifications. Checking and confirming equipment calibration settings and operating methods Observing and monitoring noise levels for correct operation. Preparation of independently powered tools may include cleaning, priming, tightening, basic repairs and</p>

		<p>adjustments.</p> <p>Identify and segregate unsafe or faulty equipment for repair or replacement.</p>
C	<p>Confirm what enterprise requirements apply to this standard.</p>	<p>Standard Operating Procedures (SOPs),</p> <p>Industry standards,</p> <p>Production schedules,</p> <p>Material Safety Data Sheets (MSDSs),</p> <p>Work notes,</p> <p>Product labels,</p> <p>Manufacturers specifications,</p> <p>Operators manuals,</p> <p>Enterprise policies and procedures (including waste disposal, recycling and re-use guidelines),</p> <p>OHS procedures,</p> <p>Supervisors oral or written instructions,</p> <p>Work and routine maintenance plans.</p>
D	<p>Confirm from the following what OHS hazards are encountered in the workplace.</p>	<p>Exposure to;</p> <p>loud noise,</p> <p>fumes,</p> <p>solar radiation,</p> <p>dust,</p> <p>ergonomic hazards associated with posture and vibration,</p> <p>hazardous substances (fuel, oils, fertiliser),</p> <p>oil and grease spills.</p>

		<p>Presence of:</p> <p>bystanders,</p> <p>livestock and wildlife,</p> <p>difficult terrain and varying gradients,</p> <p>potholes,</p> <p>ditches,</p> <p>gullies,</p> <p>embankments,</p> <p>obstacles (rocks, logs, fences,</p> <p>debris, buildings),</p> <p>extreme weather conditions, electricity, overhead powerlines, mechanical malfunctions and exposed moving parts, and other machinery including hydraulics.</p>
E	<p>Confirm how safe and controlled operation of machinery and equipment has been demonstrated.</p>	<p>This should include:</p> <p>Appropriate selection and use of specialised plant and equipment.</p> <p>Using operational techniques for the specific terrain (on and off-road environments) and weather conditions.</p> <p>Maintaining working loads within specifications including ensuring hitch-points are operated at the correct height.</p>
	<p>Confirm what personal protective</p>	<p>Boots,</p>

F	clothing and equipment is relevant to this standard.	hat/hard hat, overalls, gloves, protective eyewear, hearing protection, respirator or facemask, and sun protection (sun hat, sunscreen).
G	Confirm what environmental implications associated with the operation of machinery and equipment.	Negative environmental impacts may result from excessive noise and exhaust emissions, the incorrect use and disposal of maintenance debris (oils containers, chemical residues), and hazardous substances (fuel, fertiliser). Impacts may also include run-off flows of water and cleaning agents from servicing, maintenance and cleaning activities, soil disturbance and dust problems from high speed and frequent traffic (including irrigation equipment).
H	Confirm what procedures are included in the shut-down of machinery and equipment.	Safe dismount procedures (including turning engine off), maintaining a clear thoroughfare, parking away from hazards, securing, engaging handbrake, removing keys, refuelling and cleaning.
I	At least one occasion	Dealing with an unplanned event by

		drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.
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Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual operation and routine maintenance of specialised plant and equipment near live electrical apparatus.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

RTC2005A Fell small tress

RTC2706A Apply chemicals under supervision

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit is to be demonstrated in relation to the operation and routine maintenance of specialised plant and equipment such as chippers, slashers, trittritters, brush cutters, stump grinders, power pruners, chemical control applicators and other related associated and powered specialised plant and equipment used near live electrical apparatus.

Excludes plant and machinery that encompasses driving/flying and associated licenses, such as aerial croppers, boom-operated mowers, insulated elevating work platforms and the like.

Preparation of risk assessment control measures that encompass job safety assessment and includes traffic control measures and compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for Safe use of equipment near live Electrical and Mechanical Apparatus.

Prevailing Licensing Requirements

Excludes any work that is or may be performed by other competent operatives within the defined “ordinary person zone”

Working near energised live electricity supply infrastructure assets

Includes periodical and pre-operational checks of the specialised plant and equipment for safe operation and conduct of maintenance checks and, associated documentation

Safe approach distances zones/Safe Working Clearance

Work permit(s) and/or access authorisation permits

Technical standards and Industry Guidelines

Ground configuration – undulations, uneven ground, soft ground, damp, etc

Plant, equipment and tools for use in electrical environments

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Assessing risk
- Assessment

RANGE STATEMENT

- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Vegetation Units

UETTDRVC32A Use specialised plant to cut vegetation above ground level near live electrical apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers removal of vegetation above ground level, up to the live work zone as defined for both Authorised and Instructed Persons in the industry guidelines associated with live electrical apparatus, using the established cutting plan relevant to the vegetation type. It encompasses the safe use of specialised plant and equipment according to requirements and established procedures. It includes safely accessing trees from ground level to remove tree limbs in a safe manner. It DOES NOT include entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

Also included is the preparation of risk assessment control measures that encompass job safety assessment. All work and zones is in compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body– Guidelines/Codes of Practices or other related requirements for Safe work and access near live Electrical and Mechanical Apparatus.

Application of the Unit

Application of the Unit 2)

This competency standards unit shall apply to Transmission, Distribution, Rail Traction, Telecommunications and Vegetation Management Control industry sectors.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each State and Territory for the safe planning and the removal of vegetation around live powerlines up to the live work zone including near live electrical apparatus, and regulations that directly relate to Occupational Health and Safety and/or contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response policies and procedures
UETTDREL14A	Working safely as a non electrical worker near live electrical apparatus
UETTDRC32A	Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus
UETTDRC27A	Monitor safety compliance for vegetation work near live electrical

Prerequisite Unit(s) 4)

apparatus

UETTDRVC33A

Apply pruning techniques to
vegetation control near live
electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 2 Writing 2 Numeracy 2

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Select and prepare specialised plant and for use near live electrical apparatus.	1.1 Specialised plant is selected and prepared to job requirements and confirmed against work plan.
	1.2 Routine pre-operational checks of specialised plant are completed to manufacturers' specifications and enterprise requirements.
	1.3 OHS hazards in the workplace are recognised, risk assessed and minimised according to enterprise requirements.
	1.4 The candidate is able to recognise and follow the requirements for safe working procedures and legislation during transport.
	1.5 The candidate has ensured procedures and risk control measures are in place and followed in the event of an incident.
	1.6 The candidate appropriately reported any incidents according to established procedures.
2 Operate Specialised Plant near live electrical apparatus.	2.1 Plant is operated in a safe and controlled manner and monitored for performance and efficiency.
	2.2 Risks to self, others and the environment are anticipated and minimisation strategies implemented accordingly.
	2.3 Suitable personal protective clothing and equipment is selected, used, maintained and stored according to OHS requirements.
	2.4 Environmental implications associated with specialised plant operation are identified, assessed and reported according to established procedures.
	2.5 Non-routine events are referred to the immediate authorised personnel for directions according to established procedures.

ELEMENT	PERFORMANCE CRITERIA
3 Complete operations and report on specialised plant operation near live electrical apparatus.	3.1 Shut-down procedures for specialised plant are completed to manufacturers' specifications and enterprise requirements.
	3.2 Specialised plant operational records are completed and maintained according to enterprise requirements.
	3.3 Malfunctions, faults, irregular performance and damage to specialised plant are detailed and reported according to enterprise requirements.
	3.4 Specialised plant is cleaned, secured and stored according to manufacturers' specifications, OHS and enterprise requirements.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of operating vegetation control plant, and equipment near live electrical apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TVC32A ESI vegetation control specialist plant use

Evidence shall show an understanding of using specialised plant to cut vegetation above ground level near live electrical apparatus to an extent indicated by the following aspects:

T1 Enterprise specific vegetation control specialised plant encompassing:

- Types and application of specialised plant – sky trim, bushy, jarraff, hedging tractor, timber pro (harvester), etc.
- Purpose and use of cutting plans relevant to the vegetation type
- Cutting techniques of vegetation control specialised plant
- Techniques in undertaking different branch cuts - scarf under-cut, top cut technique, top scarf - bottom-back cut technique, side scarf opposite back-cut technique, including size of cut.
- Understanding of definitions of drop zone and full zone.
- Pre-operational checks on vegetation control specialised plant
- Electrical test requirements e.g. test and certify periodically.
- Techniques in safely using vegetation control specialised plant - visual inspection of vegetation control specialised plant, methods of using equipment at heights and in confined spaces, precautions to note during use of specialised plant (proximity of other personnel, proximity of powerlines and obstacles, role of safety observer, length of power lead and possible fire danger due to sparks)
- Types of personal protective equipment used in conjunction with vegetation control specialised plant - head protection, eye protection, hearing protection, hand protection, foot protection, body protection, general protection.
- Basic maintenance of vegetation control specialised plant - cleaning, proper storage, basic repair and replacement and testing for compliance to manufacturer's and OHS requirements.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and,
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/ equipment/ materials/ procedures/ workplaces/ other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Confirm what range of specialised plant are covered in this standard in at least 3 of the following:	<p>Mechanical Tree Trimmer.</p> <p>Boom-operated Mower.</p> <p>Boom-operated Groomer</p> <p>Hedgers</p> <p>*Pre and post operational checks, inspections and minor maintenance.</p> <p>*Safe deployment of machinery and equipment in varying conditions and weather.</p> <p>(* Must do)</p>
B	Determine what is involved in routine pre-operational checks of specialised plant and equipment.	<p>Pre-start and safety checks as per manufactures specifications.</p> <p>Checking and confirming equipment calibration settings and operating methods</p> <p>Observing and monitoring noise levels for correct operation.</p> <p>Preparation of independently powered tools may include cleaning, priming, tightening, basic repairs and</p>

		<p>adjustments.</p> <p>Identify and segregate unsafe or faulty equipment for repair or replacement.</p>
C	<p>Determine what enterprise requirements apply to this standard.</p>	<p>Standard Operating Procedures (SOPs),</p> <p>Industry standards,</p> <p>Production schedules,</p> <p>Material Safety Data Sheets (MSDSs),</p> <p>Work notes,</p> <p>Product labels,</p> <p>Manufacturers specifications,</p> <p>Operators manuals,</p> <p>Enterprise policies and procedures (including waste disposal,</p> <p>Recycling and re-use guidelines),</p> <p>OHS procedures,</p> <p>Supervisors oral or written instructions,</p> <p>Work and routine maintenance plans.</p>
D	<p>Determine from the following what OHS hazards are encountered in the workplace.</p>	<p>Exposure to;</p> <p>loud noise,</p> <p>fumes,</p> <p>solar radiation,</p> <p>dust,</p> <p>ergonomic hazards associated with posture and vibration,</p> <p>hazardous substances (fuel, oils, fertiliser),</p> <p>oil and grease spills.</p>

		<p>Presence of: bystanders, livestock and wildlife, difficult terrain and varying gradients, potholes, ditches, gullies, embankments, obstacles (rocks, logs, fences, debris, buildings), extreme weather conditions, electricity, overhead powerlines, mechanical malfunctions and exposed moving parts, and other machinery including hydraulics.</p>
E	<p>Confirm how safe and controlled operation of machinery and equipment has been demonstrated.</p>	<p>This should include: Appropriate selection and use of specialised plant and equipment. Using operational techniques for the specific terrain (on and off-road environments) and weather conditions. Maintaining working loads within specifications including ensuring hitch-points are operated at the correct height.</p>
	<p>Determine what personal protective</p>	<p>Boots,</p>

F	clothing and equipment is relevant to this standard.	hat/hard hat, overalls, gloves, protective eyewear, hearing protection, respirator or facemask, and sun protection (sun hat, sunscreen).
G	Confirm what environmental implications associated with the operation of machinery and equipment.	Such as: the use and disposal of maintenance debris and hazardous substances, run-off flows of water and cleaning agents from servicing maintenance and cleaning activities Soil disturbance and dust problems
H	Confirm what procedures are included in the shut-down of machinery and equipment.	As per manufacturers safe operating procedures
I	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual operation and routine maintenance of specialised plant and equipment near live electrical apparatus.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

RTC2307A Operate machinery and equipment

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit is to be demonstrated in relation to the operation and routine maintenance of specialised plant that encompasses driving/flying and associated licenses, such as Mechanical Tree Trimmer, boom-operated mowers, and the like used near live electrical apparatus.

Excludes specialised plant and equipment such as wood-chippers, chainsaws, brush cutters, slashers/tritters, power pruners, chemical control applicators and other related associated and powered vegetation control machinery and equipment used at ground level near live electrical apparatus.

Preparation of risk assessment control measures that encompass job safety assessment and includes traffic control measures and compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for Safe use of equipment near live Electrical and Mechanical Apparatus.

Prevailing Licensing Requirements

Excludes any work that is or may be performed by other competent operatives within the defined “ordinary person zone”

Working near energised live electricity supply infrastructure assets

Includes periodical and pre-operational checks of the specialised plant for safe operation and conduct of maintenance checks and, associated documentation

Safe approach distances zones/Safe Working Clearance

Work permit(s) and/or access authorisation permits

Technical standards and Industry Guidelines

It may also include other areas such as: Feeder route plans, infrastructure constructions and excavations, rural applications, road construction, pavements and inclement weather

Ground configuration – undulations, uneven ground, soft ground, damp, etc

Plant, equipment and tools for use in electrical environments

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk

RANGE STATEMENT

- Assessment
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Vegetation Units

UETTDRVC33A Apply pruning techniques to vegetation control near live electrical apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This Competency Standard Unit covers the pruning principles and techniques to perform vegetation clearing activities in accordance with the Australian Standard Pruning of Amenity Trees AS4373 so as to achieve the statutory vegetation clearance requirements near live electrical apparatus up to the live work zone as defined for both Authorised and Instructed Persons in the industry guidelines associated with live electrical apparatus. Pruning activities may be performed from ground level or above ground level.

It does not include the full gamut of rigging techniques and practices required of a Rigger or entry into to the safe approach distance (SAD) as defined for persons, mobile plant, equipment and specialised tools.

Also included is the preparation of risk assessment control measures that encompass job safety assessment. Encompassed is compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

Competency is demonstrated by the application of knowledge and skills to a range of pruning tasks and roles usually within established enterprise routines.

Application of the Unit

Application of the Unit 2)

This competency standards unit shall apply to Transmission, Distribution, Rail Traction, Telecommunications and Vegetation Management Control industry sectors.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each State and Territory for the safe planning for the removal of vegetation around live powerlines up to the live work zone including near live electrical apparatus, and regulations that directly relate to Occupational Health and Safety and/or contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response

Prerequisite Unit(s) 4)

	policies and procedures
UETTDREL14A	Working safely as a non electrical worker near live electrical apparatus
UETTDRC23A	Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus
UETTDRC27A	Monitor safety compliance for vegetation work near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 2 Writing 2 Numeracy 2

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Identify pruning principles and the various pruning techniques near live electrical apparatus and its effects on vegetation.	1.1 Pruning principles are explained in an arboriculture context.
	1.2 The differentiation between formative, corrective and preventative pruning is clarified.
	1.3 Describe the effects poor pruning practices have on the shape and future structure of various tree species.
	1.4 Detail the pruning requirements for various situations and plant types growing in proximity to power lines.
	1.5 Principles of natural target pruning are explained in accordance with accepted standards.
	1.6 Identify branch collars, branch bark ridge and the sequence for branch removal.
2 Prepare for pruning near live electrical apparatus	2.1 Pruning instructions are obtained and confirmed.
	2.2 Pruning tools and equipment are selected according to the location, access and size of material to be pruned.
	2.3 Pre-operational and safety checks are carried out on pruning tools and equipment according to manufacturers specifications and enterprise work procedures.

ELEMENT	PERFORMANCE CRITERIA
	2.4 Pruning tools and equipment are prepared for use.
	2.5 Suitable safety and personal protective equipment (PPE) is selected, used and maintained.
3 Undertake pruning near live electrical apparatus	3.1 Pruning site is suitably signed and barricaded during pruning operations in accordance with enterprise work procedures.
	3.2 Plant material to be pruned or removed is carried out in accordance with established standards.
	3.3 The pruning activities are undertaken according to enterprise work procedures and OHS requirements.
	3.4 Pruning tools and equipment are operated safely and effectively.
	3.5 Where required, hygiene practices are observed during pruning operations.
4 Complete pruning activity near live electrical apparatus.	4.1 Prunings and waste material removed from the site are disposed of in an environmentally aware and safe manner according to enterprise work procedures.
	4.2 Correct manual handling techniques are used when lifting or moving heavy loads.
	4.3 Pruning tools and equipment are cleaned, maintained and stored according to enterprise work procedures.
	4.4 A clean and safe area is maintained throughout and on completion of work.
	4.5 Workplace records are maintained according to enterprise guidelines.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of planning for the removal of vegetation up to vegetation exclusion zone near live electrical apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TVC33A ESI vegetation control pruning techniques

Evidence shall show an understanding of pruning techniques to vegetation control near live electrical apparatus to an extent indicated by the following aspects:

T1 Pruning principles near powerlines encompassing:

- Reasons for pruning around powerlines
- Identifying site conditions - inspection methods of vegetation to be pruned what to look for, determination of work-site working area, identification of possible endangered species, identification of appropriate personnel protective equipment to be used, identification of the location of plant, tools, equipment and fellow workmates for safe work practices.
- Inspecting location and determining work methods
- Principles of correct pruning practice - types of pruning (Formative, Corrective, Preventative, Natural target pruning),
- Cutting Techniques - different branch cuts (single top cut technique, single under-cut, handsaw technique for light small branches, chainsaw technique for heavy branches, single side-cut technique, step cut - under-cut then a top cut, technique, scarf under-cut- then top cut technique, top scarf - bottom-back cut technique, side scarf - then opposite back-cut technique, spear-cut technique, snipping/cutting back overhang (lv).
- Correct pruning practices (AS 4373 Pruning of amenity trees) according to enterprise requirements.
- Effects of pruning - incorrect pruning, how much to prune, size of cut

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UET12”. Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
 - Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/ equipment/ materials/ procedures/ workplaces/ other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Demonstrate correct pruning principles and techniques.	The goals of pruning may include to shape, form, correct or control growth, prevent disease or damage, promote health, control capacity and vigour, and provide clearance for electrical assets.
B	Demonstrate all of the following OHS requirements	identifying hazards, assessing and reporting risks, cleaning, maintaining and storing tools and equipment, appropriate use of personal protective equipment including sun protection, drinking to avoid dehydration, safe operation of tools and equipment, correct manual handling, basic first aid, personal hygiene and reporting problems to supervisors.
C	Demonstrate all of the following:	Identification of potential hazards. Practical application of legislation and codes of

		<p>practice.</p> <p>Implement control measure(s) to eliminate/reduce hazard(s)/incident.</p> <p>Apply incident reporting/recording/investigation procedures.</p> <p>Apply safe manual handling techniques.</p>
D	Demonstrate appropriate selection of all of the following pruning equipment	<p>ropes,</p> <p>handsaws,</p> <p>hand and battery-powered secateurs,</p> <p>pneumatic snips and compressor,</p> <p>hedge trimmers both manual and powered,</p> <p>small chainsaws and hydraulic and motorised pole-saws.</p>
E	Determine what personal protective equipment (PPE) is required to undertake pruning activities.	<p>Hat/hardhat</p> <p>boots,</p> <p>overalls,</p> <p>gloves,</p> <p>protective eyewear,</p> <p>respirator or face mask,</p> <p>face guard,</p> <p>hearing protection,</p> <p>sunscreen lotion</p>
F	Determine what hygiene management practices are required while pruning?	<p>Such as: Sterilisation of clothing, tools and equipment</p> <p>Management debris removal</p>

G	Demonstrate the correct cutting angle for all of the following.	Branch Bark Ridge Stem Bark Ridge Co-dominant Stem Visible Branch Collar
H	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above list items

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to safely undertake actual planning for the removal of vegetation up to the vegetation exclusion zone near live electrical apparatus.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment 9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is

expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the pruning principles and techniques to perform vegetation clearing activities in accordance with the Australian Standard Pruning of Amenity Trees AS4373 so as to achieve the statutory vegetation clearance requirements near live powerlines up to the live work zone as defined for both Instructed and Authorised Persons in the industry guidelines associated with live electrical apparatus.

Includes electrical and communications conductors and cables/powerlines and associated equipment on poles and structures according to requirements and established procedures.

Excludes the full gamut of rigging techniques and practices required of a Rigger or entry into to the safe approach distance (SAD) as defined for persons, mobile plant, equipment and specialised tools.

Includes appropriate pruning and/or cutting techniques and practices (encompasses cutting plan) for given vegetation species to minimise regrowth within the electrical field according to requirements and procedures.

Includes the preparation of risk assessment control measures that encompass job safety assessment and compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body – Guidelines/Codes of Practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

Working safely up to the defined “ordinary person zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker/ordinary persons and in some instances vegetation.

Risk assessment control measures that encompass job safety assessment.

Excludes any work that is or may be performed by other competent operatives within the defined “ordinary person zone”

Electricity supply infrastructure assets including electrical apparatus, electrical and communication conductors, and equipment

Safe approach distances zones/Safe Working Clearance

Vegetation control includes: site rehabilitation, horticultural vegetation cutting and pruning techniques to minimise regrowth - chemicals and physical cutting and pruning tools/equipment, concerns for vegetation type/species and significance – heritage, significant, urban/rural; vegetation fire prone areas and areas of particular significance.

Constants and variables included in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement.

RANGE STATEMENT

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Environmental management documentation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification.
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Testing procedures
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Vegetation Units

UETTDRC34A Undertake release and rescue from a tree near live electrical apparatus

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This competency standard covers the process of release and rescue of a tree climber working near live electrical apparatus, where an injured or unconscious tree climber is safely brought to the ground from a tree. Rescue and release safe working procedures requires hazard identification, basic first aid and emergency procedures, and tree climbing techniques. Release and rescue is likely to be undertaken in emergency situations with little or no supervision. Discretion and judgement is required in the selection of equipment, organisation of rescue, and associated actions. Competency is demonstrated by the application of knowledge and skills to a range of rescue tasks and roles usually within established enterprise guidelines.

It includes safely accessing trees from above ground level to install restraints/slings, removing tree limbs in a safe manner and, clearing debris from the felling site to eliminate the occurrence of electrical incidents. It DOES NOT include entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

Also included is the preparation of risk assessment control measures that encompass job safety assessment. All work and zones are in compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, industry bi-partite body – Guidelines/Codes of Practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

Application of the Unit

Application of the Unit 2)

This unit shall apply to Transmission, Distribution, Rail Traction, Telecommunications and Vegetation Management Control industry sectors.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each State and Territory for the safe planning and removal of vegetation around live powerlines up to the live work zone including near live electrical apparatus, and regulations that directly relate to Occupational Health and Safety and/or contracts of training where they apply.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UETTDREL13A	Comply with sustainability, environmental and incidental response

Prerequisite Unit(s) 4)

	policies and procedures
UETTDREL14A	Working safely as a non electrical worker near live electrical apparatus
UETTDRC23A	Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus
UETTDRC27A	Monitor safety compliance for vegetation work near live electrical apparatus

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 2 Writing 2 Numeracy 2

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for release and rescue from a tree near live electrical apparatus.	1.1 OHS policies and procedures to be followed for the work to be performed are received and confirmed.
	1.2 Relevant requirements and established procedures to be followed for the work to be performed in accord with the aerial rescue are discussed with all personnel to establish and confirm the work schedule.
	1.3 Identify enterprise electrical apparatus, voltages and determine safe working clearances and conductive path.
	1.4 Rescue equipment and first aid kit are checked to ensure they are complete and placed within easy access.
	1.5 Resources including, equipment, tools, approved platforms and personal protective equipment (PPE) required for the job are selected, checked in working order and maintained according to established procedures.
	1.6 Emergency communication system used to summon emergency services is checked according to manufacturer's specifications and enterprise work procedures.
	1.7 Emergency plan is confirmed and clarified with work team prior to work being undertaken.
	1.8 Hazards are identified, OHS risks associated with working near live electrical apparatus are identified and reported according to established

ELEMENT	PERFORMANCE CRITERIA
	procedures.
	1.9 Scope of responsibility under the relevant work permit(s)/access authorisation(s) identified according to requirements and established procedures with relevant personnel.
	1.10 Relevant responsibility associated with First Aid, working aloft, and/or other related work safety procedures at the worksite are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident.
	1.11 Road signs, barriers and warning devices are obtained and positioned in accordance with given instructions and requirements.
	1.12 Pre-operational checks are undertaken to confirm safe and correct operation of tools and equipment for safe use near live electrical apparatus according to requirements and established procedures
2 Carry out the release and rescue from a tree near live electrical apparatus.	<p>2.1 OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures.</p> <p>2.2 Lifting, climbing, working aloft, and use of tools/equipment, techniques and practices are safely followed in accordance with given instructions and, according to requirements confirmed to eliminate the prospects of incidents.</p> <p>2.3 Operational knowledge for the release and rescue from a tree near electrical apparatus is confirmed according to requirements and established procedures.</p> <p>2.4 Emergency situation is assessed and emergency management plan activated according to enterprise requirements, established procedures.</p> <p>2.5 Assistance requested from work team and/or public according to requirements and enterprise</p>

ELEMENT	PERFORMANCE CRITERIA
	procedures.
	2.6 Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are monitored and suitable controls implemented/reported/referred to the immediate authorised personnel for directions according to established procedures.
	2.7 Appropriate access equipment to effect rescue is identified according to enterprise standards.
	2.8 Nature of the injury is assessed according to established procedures.
	2.9 Casualty and rescuer are safely secured according to enterprise standards .
	2.10 Injuries are assessed to determine whether or not to move casualty based on standard first aid procedures and risk assessment.
	2.11 Casualty with possible neck or spinal injuries is supported (but not moved) to await expert medical treatment.
	2.12 First aid able to be performed above ground is applied, as required, in line with standard procedures.
	2.13 Instructions to ground staff and climbers are communicated clearly and concisely according to established procedures.
	2.14 Casualty is prepared for descent according to first aid and risk assessments.
	2.15 Casualty is lowered safely to the ground with support of rescuer.
	2.16 Non-routine events are referred to the immediate authorised personnel for directions according to established procedures.
3 Complete the release and rescue from a tree near live electrical	3.1 First aid is applied on the ground according to need and industry standard procedures.
	3.2 Emergency assistance is obtained as per

ELEMENT

apparatus.

PERFORMANCE CRITERIA

emergency plan.

- 3.3 Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures.
- 3.4 Work site is rehabilitated, cleaned-up, sustainable energy principles and practices applied, and made safe in accordance with given instructions and established procedures or an agreed standard.
- 3.5 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures.
- 3.6 Appropriate personnel are notified of work completion according to established procedures.
- 3.7 Post-operational checks, minor maintenance and/or relevant documentation of equipment and tools/platform are conducted according to requirements.
- 3.8 Works completion records of release and rescue, report forms/data sheets are completed accurately in accordance with given instructions and established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) Essential Knowledge and Associated Skills (EKAS): This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of releasing and rescuing near live electrical apparatus.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-TVC34A ESI vegetation control release and rescue from a tree

Evidence shall show an understanding of undertaking a release and rescue from a tree near live electrical apparatus to an extent indicated by the following aspects:

T1 Climbing techniques encompassing:

- Commonwealth, State and local government legislation, standards, codes, supply authority regulations and or enterprise requirements including relevant certification and licensing applicable to climbing for the purpose of vegetation control
- Items/structures that are and are not permissible to climb for vegetation control
- Safety precautions which are specific to climbing structures for the control of vegetation - safe working practices and procedures, Occupational Health and Safety hazards and precautions, identification of OHS hazards, assessment and control of OHS risks, types, selection, maintenance, storage and use of personal protective equipment including harnesses, dangers of climbing in confined spaces and at heights, permit to work systems and isolation procedures/protocols, safe working policies, procedures and practices when climbing, emergency response and rescue including First Aid etc.
- Techniques in rigging - safety procedures including safety ropes and lines, checking and setting up equipment, load calculations/estimations, techniques in using rigging equipment, determining the serviceability of ropes and other lowering devices.
- Load charts - safe working load estimates — field formulas, branch and trunk calculations, mathematical calculations and use of technology related to loads, slings, weights, and height
- Tree climbing and pruning practices - safe climbing with ropes and harnesses, methods of ensuring operation of safety lines and ropes, roping techniques, load bearing equipment and lifts, purposes of restraints, straps, slings, bends and hitches, purposes of pulleys, maillon rapides, lowering drum, T-bar flying capstan.

T2 Basic emergency procedures in releasing a person from an energised position encompassing:

- Commonwealth, State and local government legislation, standards, codes, supply authority regulations and or enterprise requirements including relevant certification and licensing applicable to the requirements of releasing a person from energised situation

REQUIRED SKILLS AND KNOWLEDGE

- Comprehension of EC24 Release and Rescue - detail a range of emergency situations that may arise during climbing operations, detail of resources available at the worksite, determining climber position with respect to live power lines in an emergency, assess response requirements, determining the appropriate personal protective equipment to be used.
- Techniques in undertaking emergency response procedures for the release of a climber - assessment of priorities of procedures to follow including isolation of supply, procedures for contacting emergency services and power supply company/asset owners, assessing the possibility of safe rescue of the climber and the factors to consider, assessing the best approach to rescuing the climber, determining appropriate personal protective equipment.
- Techniques in climbing tree or structure
- Techniques in safely removing climber from energised and/or de-energised supply
- Techniques to the application of First Aid procedures including CPR
- Techniques in lower climber to the ground
- Techniques in First Aid procedures when climber is on the ground

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the Performance Criteria and the Range Statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all component parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord

with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UET12". Evidence shall also comprise:

- A representative body of Performance Criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and range; and
 - Apply sustainable energy principles and practices as

- specified in the Performance Criteria and range; and
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit to such an extent that the learner’s performance outcome is reported in accordance with the preferred approach; namely a percentile graded result, where required by the regulated environment; and
- Demonstrate an appropriate level of employability skills; and
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:

Range of tools/equipment/materials/procedures/workplaces/other variables		
Group No	The minimum number of items on which skill is to be demonstrated	Item List
A	Confirm all of the following	OHS safety practices and procedures. Basic first aid , electric shock and resuscitation. Procedures in the event of/responding to, incidents. Constant analysis and decision making relevant to the safety of the work, taking into account prevailing site conditions (lay of the land) and on-going weather conditions.
B	Given a rescue situation, confirm the selection of the relevant rescue equipment from the following.	First aid kit Emergency contact numbers Harness Lifeline

		<p>prussik loop</p> <p>karabiners</p> <p>climbing spurs</p> <p>flipline/polestrap</p> <p>pulleys</p> <p>tube tape.</p>
C	<p>Given a rescue situation, confirm the selection of the required safety equipment from the following.</p>	<p>Pedestrian barriers</p> <p>Traffic barriers</p> <p>Warning signs</p> <p>Road signs</p> <p>Danger signs</p> <p>Flashing lights</p> <p>Traffic bollards</p> <p>Safety mesh</p> <p>Witches hats.</p>
D	<p>Given a rescue situation, confirm the selection of the personal protective equipment (PPE) from the following.</p>	<p>Steel cap boots</p> <p>Six point safety helmet</p> <p>Ear protection</p> <p>Eye protection</p> <p>Cut resistant trousers or chaps</p> <p>Hi Vis Clothing</p> <p>Close fitting work clothes</p> <p>Gloves</p>
E	<p>Confirm emergency communication systems used to summon emergency services using the following.</p>	<p>Checked for good working order and adequate battery power/within range for:</p> <p>mobile phone</p> <p>landline</p> <p>two-way radio</p>
F	<p>Confirm an</p>	<p>The location and</p>

	<p>emergency plan is put into action dealing with the following</p>	<p>selection of the appropriate emergency contact numbers for: ambulance, medical centre police, fire brigade and/or electrical company. The site location details such as: grid reference, first aiders, and procedures..</p>
G	<p>Confirm how a casualty response maybe determined incorporating all of the following.</p>	<p>Casualty response: verbal/nonverbal communication. observation. Observation noted: Patient conscious. Extent of patient injuries. Patient ability to assist in their rescue.</p>
H	<p>Identify hazards associated with rescue that need to be assessed from all of the following.</p>	<p>Hazards: electrical wires, energised trees and equipment, unstable branches or structures, insect swarm, climbing, fatigue, moving vehicles and equipment, heat and cold, manual handling, presence of blood and</p>

		other bodily fluids.
I	Assess controls are implemented to minimise the risk of OHS hazards from all of the following.	<p>Implementation of:</p> <p>The enterprise OHS policies and procedures.</p> <p>The securing of the site.</p> <p>The appropriate use of PPE.</p> <p>The appropriate use of safety equipment such as signage and protective barriers;</p> <p>The safe operation of tool, equipment and machinery.</p> <p>The correct manual handling</p> <p>The basic first aid available on site.</p> <p>The process and procedures in reporting problems to supervisors/emergency services.</p> <p>The availability of drinking liquids, and warm clothing.</p>
J	Determine the selection and use of appropriate access equipment required to effect rescue using the following	<p>Climbing spikes.</p> <p>Ropes.</p> <p>Climbing harness.</p> <p>Safety lines.</p> <p>Aerial lifts.</p> <p>Ladder.</p> <p>Crane or elevating work platform (EWP).</p>
K	Demonstrate how the casualty will be prepared for descent	Immobilising the head and neck.

	incorporating the following	Setting life lines. Use of slings. Harnesses and pulleys. Releasing the flip line. Use of rescue stretcher.
L	Demonstrate the following	Perform a release and rescue according to requirements and established procedures.
M	Confirm the completion of the appropriate records for the release and rescue operations incorporating all of the following.	Accident/Incident reports. Workcover forms. Risk assessment details. PPE issue and replacement dates. Equipment maintenance checklists. Safety audits.
N	At least one occasion	Dealing with an unplanned event by drawing on essential knowledge and associated skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to safely undertake actual cutting/pruning of vegetation above ground up to the vegetation exclusion zone near live electrical apparatus using the climbing technique.

In addition to the resources listed above, in Context of and specific resources for assessment, evidence should show demonstrated competency working below ground, in limited spaces, with different structural/construction types and method and in a variety of environments.

Method of assessment

9.4)

This Competency Standard Unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Transmission, Distribution and Rail Traction Industry. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and associated skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with the following units:

RTF2027A Undertake standard climbing techniques

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

This Competency Standard Unit shall be demonstrated in relation to the release and rescue of personnel from a tree near live electrical apparatus as defined for both Authorised and Instructed Persons in the industry guidelines associated with live electrical apparatus.

Utilisation of climbing techniques in conjunction with aerial emergency rescue procedures and, inspection and preparation of climbing equipment with recommendations for corrective action being referred to appropriate authorities

Aerial work is conducted using regulator and/or industry approved climbing technique and includes height fall protection emergency rescue near live electrical apparatus

Safety practices include: the safe use of appropriate/specialised tools and equipment, the safe use of vegetation climbing equipment and techniques and may include safely accessing trees to install restraints/slings, removing tree limbs in a safe manner, clearing debris from the felling site to eliminate the occurrence of electrical incidents and reparation of risk assessment control measures that encompass job safety assessment. It also includes working safely up to the defined “ordinary person zone” near energised electrical apparatus (inc. electrical powerlines) for non-electrical worker/ordinary persons and risk assessment control measures that encompass job safety assessment.

Excludes entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

Work and zones is in compliance with relevant State or Territory regulatory agencies/bodies, local government legislation, Industry bi-partite body– Guidelines/Codes of Practices or other related requirements for safe work and access near live electrical and mechanical Apparatus

Excludes any work that is or may be performed by other competent operatives within the defined “live work zone”

Electricity supply infrastructure assets condition – sagging, swaying, ties, cross arms, poles, insulators, conductors, service wires, electrical apparatus/equipment, etc.

Safe approach distances zones/Safe Working Clearance

Other areas which may need to be taken into consideration are: work permit(s) and/or access authorisation permits, technical standards and Industry Guidelines, rural applications, inclement weather, ground configuration and access – undulations, uneven ground, soft ground, damp, road construction, pavements, etc, feeder route plans and the use of technology and mathematical calculations

Equipment and specialised tools for use in electrical environments and loading and slinging techniques

RANGE STATEMENT

Vegetation control includes: site rehabilitation, horticultural vegetation cutting and pruning techniques to minimise regrowth - chemicals and physical cutting and pruning tools/equipment, concerns for vegetation type/species and significance – heritage, significant, urban/rural; vegetation fire prone areas and areas of particular significance.

The following constants and variables included in the Element/Performance Criteria in this unit are fully described in the Definitions Section 1 of this volume and form an integral part of the Range Statement of this unit:

- Appropriate and relevant persons (see Personnel)
- Appropriate authorities
- Appropriate work platform
- Assessing risk
- Assessment
- Authorisation
- Documenting detail work events, record keeping and or storage of information
- Drawings and specifications
- Emergency
- Environmental and sustainable energy procedures
- Environmental legislation
- Established procedures
- Fall prevention
- Hazards
- Identifying hazards
- Inspect
- Legislation
- MSDS
- Notification
- OHS practices
- OHS issues
- Permits and/or permits to work
- Personnel
- Quality assurance systems
- Requirements
- Work clearance systems

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
Vegetation Units

AHCARB202A Fell small trees

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers the process of small tree felling and defines the standard required to: prepare and properly maintain equipment; determine the tree felling conditions, direction of fall, safe fall zone, exclusion zone and escape route; use safe tree felling techniques; use safe tree removal techniques.
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Application of the Unit

Application of the unit	This unit applies to the process of small tree felling where hazards have been assessed as low risk.
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Not Applicable

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
1. Identify tree felling requirements	<p>1.1. Instructions for tree felling operations are received and clarified with supervisor prior to work being undertaken.</p> <p>1.2. Topography and site conditions are assessed and factors influencing the natural direction of fall are identified and confirmed with supervisor.</p> <p>1.3. Tree is visually assessed and factors influencing the tree felling operation are identified and confirmed with supervisor.</p> <p>1.4. Natural direction of fall, safe fall zone and exclusion zone are determined and confirmed with supervisor.</p> <p>1.5. Occupational Health and Safety (OHS) hazards associated with felling operation are identified, risks assessed and reported to the supervisor.</p>
2. Prepare for tree felling	<p>2.1. Felling equipment and component options that are appropriate to the task being undertaken are selected and prepared.</p> <p>2.2. Appropriate support tools are prepared, transported and placed to minimise felling delays.</p> <p>2.3. Suitable safety equipment and Personal Protective Equipment (PPE) are selected, checked, used, maintained and stored.</p> <p>2.4. Fall zone is cleared of obstacles and articles which may be damaged by felled tree.</p> <p>2.5. Clear escape route is established appropriate to the site and according to recognised guidelines.</p>
3. Fell tree	<p>3.1. Location of other personnel is noted and monitored.</p> <p>3.2. Standard tree felling techniques are determined by ground conditions and state of canopy.</p> <p>3.3. Corrective action is taken in response to changing conditions or problems encountered.</p> <p>3.4. Planned escape route is used when tree starts to fall.</p> <p>3.5. Fall of tree and movement on ground are monitored until felled tree is stable.</p> <p>3.6. Safe working practices are employed according to OHS requirements.</p>
4. Complete tree felling operation	<p>4.1. Appropriate method of clearing the site of felled tree is determined.</p> <p>4.2. Machinery required for removal of felled tree is selected and used according to manufacturer's specifications and OHS requirements.</p>

ELEMENT	PERFORMANCE CRITERIA
	4.3. Fall site is cleared of tree and all tree debris.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- interpret work procedures
- demonstrate safe working practices
- communicate orally and using hand signals with other personnel
- participate in teams and contribute to team objectives
- determine safe fall zones and exclusion zones
- measure distances
- monitor and maintain tree felling tools and equipment
- recognise structural defects, common diseases, pests, and nutrition deficiencies
- operate a chainsaw
- recognise caution or hazard signs and symbols
- interpret tasks or information from labels, manuals or written instructions
- record information accurately or verbally report information
- use literacy skills to follow sequenced written instructions and record information accurately and legibly
- use oral communication skills/language competence to fulfil the job role as specified by the organisation including questioning, active listening, asking for clarification and seeking advice from supervisor
- use numeracy skills to estimate, calculate and record routine workplace measures
- use interpersonal skills to relate to people from a range of social, cultural and ethnic backgrounds and with a range of physical and mental abilities.

Required knowledge

- basic operational and maintenance requirements of tree felling equipment
- safe working practices for chainsaw operation
- safety procedures and potential hazards for working safely in the amenity tree industry
- emergency and first aid procedures
- the effect of tree removal on the environment
- local government regulations that apply to tree removal where appropriate
- identification of services and other hazards that affect the performance of the unit

REQUIRED SKILLS AND KNOWLEDGE

- | |
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| <ul style="list-style-type: none">• principles and methods of inspecting trees to identify structural defects. |
|--|

Evidence Guide

EVIDENCE GUIDE	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>The evidence required to demonstrate competency in this unit must be relevant to workplace operations and satisfy holistically all of the requirements of the performance criteria and required skills and knowledge and include achievement of the following:</p> <ul style="list-style-type: none"> • prepare and properly maintain equipment • determine the tree felling conditions, direction of fall, safe fall zone, exclusion zone and escape route • use safe tree felling techniques • use safe tree removal techniques
Context of and specific resources for assessment	Competency requires the application of work practices under work conditions. Selection and use of resources for some worksites may differ due to the regional or enterprise circumstances.

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole.	
Trees may include:	<ul style="list-style-type: none"> • all species of trees and woody tree like vegetation forms.

Unit Sector(s)

Unit sector	Arboriculture
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Co-requisite units

Co-requisite units		

Competency field

Competency field	
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AHCARB204A Undertake standard climbing techniques

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers the process of climbing small trees with ropes and harness for the purpose of pruning and defines the standard required to: carry out pre-operational and safety checks; identify and report site and tree hazards and implement risk controls; select, prepare and inspect ropes, harnesses and other equipment associated with climbing trees; safely climb/ascend and descend a tree with rope and harness; climb using documented low risk work methods; inspect for faults and store ropes, harnesses and other climbing and safety equipment and record and replace if worn or faulty.
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Application of the Unit

Application of the unit	This unit applies to the basic techniques used to climb trees in Arboriculture and applies to a climbing tree worker. This standard involves working under routine supervision with intermittent checking by supervisors or qualified arborists. Climbing techniques follow documented low risk work methods and procedures.
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Not Applicable

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for climbing operations	1.1. Climbing instructions and methods are determined according to enterprise Standard Operating Procedures (SOPs). 1.2. Hazards associated with the climb are identified and reported to the supervisor. 1.3. Climbing tools and equipment are selected, prepared and used according to supervisor's instructions and manufacturer's guidelines.
2. Tie knots required for tree climbing operations	2.1. Ropes specific to the task are selected and inspected for wear, damage and soundness. 2.2. Industry recognised knots are used in accordance with the required application. 2.3. All knots are checked on completion in accordance with established workplace practice.
3. Climb trees in a low hazard work environment	3.1. Personal Protective Equipment (PPE) and safety equipment is selected, maintained and used according to enterprise procedures. 3.2. Climbing is undertaken using standard industry methods, enterprise SOPs and according to Occupational Health and Safety (OHS) requirements.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- identify hazards and report risks
- select and prepare climbing tools and equipment
- select and inspect ropes
- use industry recognised knots
- climb trees and use ropes
- estimate tree heights and loads
- interpret supervisors directions and communicate with fellow team members
- minimise noise, dust, and high activity vehicle traffic to prevent nuisance-level environmental disturbance
- follow guidelines, instructions and supervision
- participate and contribute to team objectives

REQUIRED SKILLS AND KNOWLEDGE

- use literacy skills to follow sequenced written instructions and record information accurately and legibly
- use oral communication skills/language competence to fulfil the job role as specified by the organisation including questioning, active listening, asking for clarification and seeking advice from supervisor
- use numeracy skills to estimate, calculate and record routine workplace measures
- use interpersonal skills to relate to people from a range of social, cultural and ethnic backgrounds and with a range of physical and mental abilities.

Required knowledge

- basic climbing principles and preparation procedures
- basic climbing techniques and planning
- safe working limit of ropes
- safe work practices relevant to tree climbing activities
- tree anatomy and physiology
- local government tree protection and preservation regulations
- AS4373-2007 Pruning of amenity trees
- relevant Code of Practice.

Evidence Guide

EVIDENCE GUIDE	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>The evidence required to demonstrate competency in this unit must be relevant to workplace operations and satisfy holistically all of the requirements of the performance criteria and required skills and knowledge and include achievement of the following:</p> <ul style="list-style-type: none"> • carry out pre-operational and safety checks • identify and report site and tree hazards, and implement risk controls • select, prepare and inspect ropes, harnesses and other equipment associated with climbing trees • safely climb/ascend and descend a tree with rope and harness • climb using documented low risk work methods • inspect for faults and store ropes, harnesses and other climbing and safety equipment and record and replace if worn or faulty.
Context of and specific resources for assessment	Competency requires the application of work practices under work conditions. Selection and use of resources for some worksites may differ due to the regional or enterprise circumstances.

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole.	
Trees may include:	<ul style="list-style-type: none"> • all species of trees and woody tree like vegetation forms where trees are healthy, free from decay, disease and pests, and are free from embedded objects such as wire, nails or spikes and are NOT prone to branch failure.
Knots may include knots such as:	<ul style="list-style-type: none"> • bowline

RANGE STATEMENT

	<ul style="list-style-type: none"> • bowline on a bight • tautline • prussik • figure 8 • clove hitch • half hitch.
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Unit Sector(s)

Unit sector	Arboriculture
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Co-requisite units

Co-requisite units		

Competency field

Competency field	
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AHCARB205A Operate and maintain chainsaws

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers the process of maintaining, preparing and operating hand-held chainsaws in a work environment and defines the standard required to: select, use, maintain and store suitable personal protective equipment; carry out routine checks and maintenance on chainsaw; apply appropriate chainsaw technique and cutting methods according to manufacturer's specifications and documented low risk work procedures; assess and minimise environmental impacts of chainsaw use; maintain records of chainsaw training and certification, risk assessment and use.
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Application of the Unit

Application of the unit	This unit applies to cross-cutting fallen timber using safe cutting techniques.
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Not Applicable

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
1. Recognise and apply workplace safety procedures	<p>1.1. Occupational Health and Safety (OHS) procedures relevant to the maintenance and operation of chainsaws are recognised and applied.</p> <p>1.2. OHS hazards are identified, risks assessed and risk controls are implemented.</p> <p>1.3. Personal Protective Equipment (PPE) is selected and used.</p> <p>1.4. Relevant licensing and legislative requirements with regard to the operation of chainsaws are recognised, accessed and applied.</p>
2. Check and maintain chainsaw	<p>2.1. Tools and materials required for maintenance procedures are selected, checked and confirmed against maintenance plan.</p> <p>2.2. Routine checks and maintenance procedures are conducted prior to operation and according to manufacturer's specifications and maintenance plan.</p> <p>2.3. Chainsaw faults or malfunctions are identified, tagged and reported for repair according to manufacturer's specifications and enterprise requirements.</p> <p>2.4. Completed chainsaw maintenance procedures are detailed and recorded.</p>
3. Operate chainsaw	<p>3.1. Sawing materials are identified and positioned for operation according to documented low risk work procedures.</p> <p>3.2. Cutting methods are determined appropriate to type of material and risk controls implemented.</p> <p>3.3. Chainsaw is operated according to manufacturer's specifications and operator's manual.</p> <p>3.4. Effective worksite communication is maintained to ensure efficient workflow and address immediate problems.</p> <p>3.5. Environmental implications associated with chainsaw operation are identified, assessed and controlled according to documented requirements.</p>
4. Complete and check chainsaw operation	<p>4.1. Chainsaw damage, malfunctions or irregular performance are recorded and reported according to enterprise requirements.</p> <p>4.2. Chainsaw is cleaned, maintained and stored according to manufacturer's specifications and enterprise requirements.</p> <p>4.3. Relevant reports are maintained to industry</p>

ELEMENT	PERFORMANCE CRITERIA
	standards according to enterprise requirements.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- identify hazards and implement safe operating procedures
- safely cross-cut fallen timber using compression and tension cuts with a hand held chainsaw
- maximise volume and quality of recovery
- demonstrate safe and environmentally responsible workplace practices
- obtain relevant licenses and permits
- read and interpret manufacturer's specifications, work and maintenance plans, and Material Safety Data Sheets (MSDSs).
- effectively communicate information, interpret and apply task instructions, and maintain records and reports
- estimate and measure dimensions, and calculate volumes
- recognise caution or hazard signs and symbols
- interpret tasks or information from labels, manuals or written instructions
- record information accurately or verbally report information
- use literacy skills to follow sequenced written instructions and record information accurately and legibly
- use oral communication skills/language competence to fulfil the job role as specified by the organisation including questioning, active listening, asking for clarification and seeking advice from supervisor
- use numeracy skills to estimate, calculate and record routine workplace measures
- use interpersonal skills to relate to people from a range of social, cultural and ethnic backgrounds and with a range of physical and mental abilities.

Required knowledge

- relevant State/Territory legislation and regulations with regard to the operation of chainsaws
- OHS legislative requirements and Codes of Practice
- hazards and risks when using chainsaws
- operating principles and operating methods
- various types of chainsaws and respective functions

REQUIRED SKILLS AND KNOWLEDGE

- effects of timber defects on recovery
- environment Codes of Practice with regard to chainsaw operation.

Evidence Guide

EVIDENCE GUIDE	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>The evidence required to demonstrate competency in this unit must be relevant to workplace operations and satisfy holistically all of the requirements of the performance criteria and required skills and knowledge and include achievement of the following:</p> <ul style="list-style-type: none"> • select, use, maintain and store suitable personal protective equipment • carry out routine checks and maintenance on chainsaw • apply appropriate chainsaw technique and cutting methods according to manufacturer's specifications and documented low risk work procedures • assess and minimise environmental impacts of chainsaw use • maintain records of chainsaw training and certification, risk assessment and use.
Context of and specific resources for assessment	Competency requires the application of work practices under work conditions. Selection and use of resources for some worksites may differ due to the regional or enterprise circumstances.

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole.	
Chainsaws may include:	<ul style="list-style-type: none"> • all types and models of hand-held chainsaws in a work environment.

Unit Sector(s)

Unit sector	Arboriculture
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Co-requisite units

Co-requisite units		

Competency field

Competency field	
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AHCCHM201A Apply chemicals under supervision

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers the process of applying chemicals under supervision using handheld or small powered equipment, and defines the standard required to: apply chemicals using handheld or small powered equipment; check, prepare, use and maintain application equipment and personal protective equipment; measure, mix, transport, handle store and dispose of chemicals and comply with Occupational Health and Safety (OHS), chemical label and Material Safety Data Sheets (MSDSs) requirements.
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Application of the Unit

Application of the unit	This unit applies to working under supervision with reference to the product label, legislation and enterprise procedures. This unit may be deemed to have a time limit when used as part of an accreditation or licence process.
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Not Applicable

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
1. Check application and personal protective equipment	1.1. Carry out pre-operational checks of application equipment in accordance with manufacturer's specification and OHS requirements. 1.2. Prepare application equipment for use in accordance with manufacturer's specification and directions. 1.3. Identify and replace any damaged or worn components. 1.4. Check personal protective equipment in accordance with manufacturer's specification and OHS requirements.
2. Prepare application equipment	2.1. Apply label information regarding precautions for the chemical mix/substance being used. 2.2. Select and use appropriate personal protective and mixing equipment in accordance with MSDSs and chemical label. 2.3. Measure, mix and load chemical mix or substances in accordance with directions on chemical label. 2.4. Follow legislative and regulatory requirements regarding chemical use including OHS. 2.5. Confirm instructions from chemical MSDSs in the event of a spill. 2.6. Check that output of application equipment is correct and in accordance with application/spray plan.
3. Apply chemicals	3.1. Assess and record meteorological conditions and forecasts prior to and during application. 3.2. Select and use appropriate personal protective equipment in accordance with MSDSs and chemical label. 3.3. Apply chemical in accordance with the application/spray plan and/or instructions. 3.4. Assess and minimise risks to others, product integrity and the environment prior to and during application.
4. Finalise work	4.1. Clean and store Personal Protective Equipment (PPE) and application equipment in accordance with manufacturer's specification and OHS requirements. 4.2. Dispose of excess chemicals and use triple rinse drums in accordance with label and MSDSs requirements. 4.3. Complete incident reports as required in accordance

ELEMENT	PERFORMANCE CRITERIA
	<p>with legislative and/or regulatory requirements.</p> <p>4.4. Complete application records.</p> <p>4.5. Store unused chemical/products in accordance with label requirements and MSDSs.</p> <p>4.6. Adhere to all re-entry and withholding periods.</p>
5. Transport and handle chemical	<p>5.1. Confirm precautions for the transport and handling of chemicals.</p> <p>5.2. Transport and handle chemicals in accordance with legislative and/or regulatory requirements.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- identify hazards and adopt safe work practices
- conduct pre-operational checks of application equipment
- use and maintain personal protective equipment
- measure, mix and load chemical mixes
- use hand held and small powered application equipment relevant to the industry sector using safe and environmentally responsible work practices
- interpret labels, record relevant information and measure application amounts
- follow chemical label requirements and application/spray plan
- record activities and maintain records
- transport and handling techniques
- respond to emergencies and apply first aid in the event of pesticide poisoning
- use oral communication skills/language competence to fulfil the job role as specified by the organisation including questioning, active listening, asking for clarification and seeking advice from supervisor
- use interpersonal skills to relate to people from a range of social, cultural and ethnic backgrounds and with a range of physical and mental abilities.

Required knowledge

- applied principles of Integrated Pest/Resistance Management
- structure of chemical label and MSDS
- types, applications, storage and fitting of personal protective equipment
- legislation and regulations including OHS and licensing requirements in relation to

REQUIRED SKILLS AND KNOWLEDGE

chemical use

- features and functions of a range of application equipment relevant to the industry sector
- risk factors including human and animal health, spillage and environmental
- principles of transport, handling and storage for chemicals
- requirements for disposal of excess chemicals, clearing spillages and equipment clean up
- transport and handling requirements
- environmental effects of selected chemicals and how to minimise damaging effects of chemicals
- different broad chemical types, eg, insecticides, herbicides and fungicides and their mode of action symbols on the label
- paths of entry of poisons into the body and methods of limiting exposure
- methods of minimising risk during application
- Regulations and Codes of Practices with regard to hazardous substances of the use of chemicals
- OHS concerning personal safety and safety of others in the workplace
- alternatives to chemicals for pest management
- possible effects on health of bystanders/public in addition to applicators
- weather conditions and means of assessing them in line with risks, and recognising when they become unsuitable for application to continue.

Evidence Guide

EVIDENCE GUIDE	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>The evidence required to demonstrate competency in this unit must be relevant to workplace operations and satisfy holistically all of the requirements of the performance criteria and required skills and knowledge and include achievement of the following:</p> <ul style="list-style-type: none"> • apply chemicals using handheld or small powered equipment • check, prepare, use and maintain application equipment and personal protective equipment • measure, mix, transport, handle store and dispose of chemicals • comply with OHS, chemical label and MSDSs requirements.
Context of and specific resources for assessment	Competency requires the application of work practices under work conditions. Selection and use of resources for some worksites may differ due to the regional or enterprise circumstances.

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole.	
Chemicals may include:	<ul style="list-style-type: none"> • the application of liquid chemical mixes • granular products • and/or biological agents used in the control of pest, weeds and diseases including animal health products.

Unit Sector(s)

Unit sector	Chemicals
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Co-requisite units

Co-requisite units		

Competency field

Competency field	
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AHCMOM304A Operate machinery and equipment

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers the process of maintaining and operating machinery and equipment and defines the standard required to: carry out pre-operational checks and maintenance and report defects if necessary; secure attachments according to manufacturer's directions; operate machinery in a safe and controlled manner; follow procedures to minimise environmental impacts; implement shut-down procedures and store machinery and equipment; record maintenance and operation details.
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Application of the Unit

Application of the unit	This unit applies to workers in agriculture, horticulture and land management who operate machinery and equipment for the enterprise. The unit is likely to be carried out under limited supervision with checking only related to overall progress.
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Not Applicable

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
1. Prepare machinery and equipment for use	<p>1.1. Machine and equipment is selected appropriate to job requirements and confirmed against a work plan.</p> <p>1.2. Routine pre-operational checks of machinery and equipment are carried out to manufacturer's specifications and enterprise requirements.</p> <p>1.3. Equipment is securely attached and calibrated for operation to manufacturer's specifications.</p> <p>1.4. Faulty machinery and equipment is identified, safety tagged, and reported to supervisor according to enterprise requirements.</p> <p>1.5. Occupational Health and Safety (OHS) hazards are identified, risks assessed and risk controls are implemented.</p>
2. Operate machinery and equipment	<p>2.1. Machinery and equipment is operated in a safe and controlled manner, and monitored for performance and efficiency.</p> <p>2.2. Risk to self, others and the environment are recognised and minimised according to enterprise and OHS requirements.</p> <p>2.3. Personal Protective Equipment (PPE) is selected, used and maintained according to procedures.</p> <p>2.4. Environmental implications associated with machinery operation are identified, assessed and taken into account.</p>
3. Check and complete machinery and equipment operation	<p>3.1. Machinery and equipment shut-down procedures are carried out to manufacturer's specifications and enterprise requirements.</p> <p>3.2. Machinery and equipment operational records are maintained according to enterprise requirements.</p> <p>3.3. Machinery and equipment damage, malfunctions or irregular performance are recorded and/or reported according to enterprise requirements.</p> <p>3.4. Machinery and equipment is cleaned, secured and stored according to manufacturer's specifications and enterprise requirements.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- identify hazards and implement safe operating procedures
- complete pre-operational checks
- recognise and report defects
- operate machinery and equipment to industry standards
- demonstrate safe and environmentally responsible workplace practices
- read and interpret manufacturer's specifications, work and maintenance plans, and Material Safety Data Sheets (MSDSs)
- interpret and apply instructions, communicate with work team and supervisor, record and report equipment faults, workplace hazards, and accidents
- measure and calculate volumes, consumption and servicing requirements
- use interpersonal skills to work with and relate to people from a range of cultural, social and religious backgrounds and with a range of physical and mental abilities.

Required knowledge

- manufacturers specifications for servicing of machinery and equipment
- operating principles and operating methods for machinery and equipment
- principles of weight distribution with regard to load shifting and machinery movement
- procedures for cleaning, securing and storing machinery, equipment and materials
- potential risks and hazards associated with the operation of machinery and equipment
- use of hazardous substances
- environmental impacts and minimisation measures associated with the operation of machinery and equipment
- OHS and environmental legislation, regulations and Codes of Practice
- relevant State/Territory legislation, regulations and Codes of Practice with regard to licensing, roads and traffic requirements.

Evidence Guide

EVIDENCE GUIDE	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>The evidence required to demonstrate competency in this unit must be relevant to workplace operations and satisfy holistically all of the requirements of the performance criteria and required skills and knowledge and include achievement of the following:</p> <ul style="list-style-type: none"> • carry out pre-operational checks and maintenance and report defects if necessary • secure attachments according to manufacturer's directions • operate machinery in a safe and controlled manner • follow procedures to minimise environmental impacts • implement shut-down procedures and store machinery and equipment • record maintenance and operation details • evidence records must include details of the machinery and equipment that the candidate was assessed on.
Context of and specific resources for assessment	Competency requires the application of work practices under work conditions. Selection and use of resources for some worksites may differ due to the regional or enterprise circumstances.

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole.	
Machinery and equipment may include:	<ul style="list-style-type: none"> • hydraulic equipment • stationary engines • spraying equipment • mulching and chipping equipment

RANGE STATEMENT	
	<ul style="list-style-type: none"> powered trailers and three point linkage equipment excludes chainsaws, tractors, vehicles and earth moving equipment.

Unit Sector(s)

Unit sector	Machinery operation and maintenance
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Co-requisite units

Co-requisite units		

Competency field

Competency field	
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AHPCPM201A Recognise plants

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers the process of recognising plants that are commonly encountered in horticulture or land management situations and defines the standard required to: inspect and research enterprise plants; observe and record the habits; characteristics and significant features of plants; use available processes to recognise plants; update a plant reference collection.
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Application of the Unit

Application of the unit	This unit involves collecting and documenting plant information and updating a plant reference collection.
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Not Applicable

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for plant recognition	1.1. Range of plants requiring recognition is identified. 1.2. Resources and equipment for use in recognition activity are prepared. 1.3. Available processes for plant recognition are identified, selected and prepared for use.
2. Recognise specified plants	2.1. Visual inspection and research processes of enterprise plants are undertaken. 2.2. Specified plants are recognised according to their identifiable characteristics and named. 2.3. Brief descriptions of plant habits, characteristics and significant features are recorded. 2.4. Advice is sought when necessary and where appropriate in the recognition activity.
3. Update the reference collection	3.1. Information about plants is documented and added to the reference collection. 3.2. Reference collection is updated as new plants are recognised.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- recognise the range of plants specific to the enterprise
- describe the plant attributes and main purpose within the enterprise
- describe the specific handling requirements and growth requirements
- identify available processes of literature searches, internet browsing, personal consultation with experts, specimen collections, field guides, workplace notes, and use of simple keys to aid recognition
- update reference collection
- use literacy skills to follow sequenced written instructions and record information accurately and legibly
- use oral communication skills/language competence to fulfil the job role as specified by the organisation including questioning, active listening, asking for clarification and seeking advice from supervisor
- use numeracy skills to estimate, calculate and record routine workplace measures
- use interpersonal skills to relate to people from a range of social, cultural and

REQUIRED SKILLS AND KNOWLEDGE

ethnic backgrounds and with a range of physical and mental abilities.

Required knowledge

- plant morphology and physiology
- range of plant identification techniques
- plant nomenclature
- enterprise procedures for obtaining and supplying advice and information about plants
- enterprise expectations about the range and number of plants to be recognised.

Evidence Guide

EVIDENCE GUIDE	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>The evidence required to demonstrate competency in this unit must be relevant to workplace operations and satisfy holistically all of the requirements of the performance criteria and required skills and knowledge and include achievement of the following:</p> <ul style="list-style-type: none"> • inspect and research enterprise plants • observe and record the habits, characteristics and significant features of plants • use available processes to recognise plants • update a plant reference collection.
Context of and specific resources for assessment	Competency requires the application of work practices under work conditions. Selection and use of resources for some worksites may differ due to the regional or enterprise circumstances.

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole.	
Plants may include:	<ul style="list-style-type: none"> • those native or introduced species (including weeds) commonly encountered in horticulture or land management situations.

Unit Sector(s)

Unit sector	Plants
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Co-requisite units

Co-requisite units		

Competency field

Competency field	
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BSBINM401A IMPLEMENT WORKPLACE INFORMATION SYSTEM

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to implement the workplace information system. It involves the identification, acquisition, initial analysis and use of appropriate information, which plays a significant part in the organisation's effectiveness.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>Frontline managers play a significant role in contributing to the organisation's effectiveness in identifying, acquiring, analysing and using appropriate information.</p> <p>At this level, work will normally be carried out within routine and non routine methods and procedures, which require planning and evaluation, leadership and guidance of others, and some discretion and judgement.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Identify and source information needs	1.1. Determine and locate information required by teams 1.2. Acquire and review information held by the organisation to determine suitability, accessibility, currency and reliability according to organisational policies
2. Collect, analyse and report information	2.1. Collect information, which is adequate and relevant to the needs of teams, in a timely manner 2.2. Ensure information is in a format suitable for analysis, interpretation and dissemination 2.3. Analyse information to identify and report relevant trends and developments in terms of the needs for which it was acquired
3. Implement information systems	3.1. Implement management information systems effectively to store, retrieve and regularly review data for decision making purposes 3.2. Use technology available in the work area to manage information effectively 3.3. Submit recommendations for improving the information system to designated persons and/or groups
4. Prepare for information system changes	4.1. Collect information about information system future needs in consultation with colleagues , including those who have a specialist role in resource management 4.2. Ensure estimates of information system future needs reflect the organisation's business plans , and customer and supplier requirements 4.3. Support proposals to secure resources by clearly presenting submissions that describe realistic options, benefits, costs and outcomes 4.4. Prepare team members to work with new technology and information system changes

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- literacy skills to work with information, and to research and present information in ways that are appropriate to the work team
- technology skills to work with a range of information systems.

Required knowledge

- information management systems and technology that would be associated with the workplace such as:
 - budgets and financial management systems
 - customer information software or records
 - databases
 - personal digital assistant (PDA)
 - product and service information
 - project management software
 - record management systems
 - spreadsheets.

Evidence Guide

EVIDENCE GUIDE	
<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> analysis of the information that is required for the effective functioning of the team's work together knowledge of the range of information systems that are, or should be, available in the workplace ability to recognise what information system changes and improvements will be required in the future.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> access to appropriate documentation and resources normally used in the workplace.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> demonstration of techniques in working with information management systems direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate oral or written questioning to assess knowledge of relevant technology review of documentation analysing information trends and developments written reports on future information system needs review of preparation undertaken for team members to work with new technology and information system changes.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p> <ul style="list-style-type: none"> other units from the Certificate IV in Frontline Management.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

<p><i>Information</i> may include:</p>	<ul style="list-style-type: none"> • archived, filed and historical background data • continuous improvement and quality assurance data • data available internally or externally • data shared and retrieved in various forms such as in writing or verbally, electronically or manually • financial and contractual data • marketing and customer-related data • organisational performance data • planning and organisational documents • policies and procedures
<p><i>Organisational policies</i> may include:</p>	<ul style="list-style-type: none"> • guidelines for decision making throughout the organisation that link the formulation of strategy with its implementation • sets of accepted actions approved by the organisation • Standard Operating Procedures
<p><i>Technology</i> may include:</p>	<ul style="list-style-type: none"> • computerised systems and software such as databases, project management and word processing • telecommunications devices • any other technology used to carry out work roles and responsibilities
<p><i>Designated persons and/or groups</i> may include:</p>	<ul style="list-style-type: none"> • groups designated in workplace policies and procedures • managers or supervisors with management roles and responsibilities concerning information systems • other stakeholders accessing the information system such as customers and service providers • other work groups or teams whose work will be affected by the system

RANGE STATEMENT	
<i>Colleagues</i> may include:	<ul style="list-style-type: none"> • employees at the same level or more senior managers • occupational health and safety committee members and other specialists • people from a range of social, cultural and ethnic backgrounds and with a range of physical and mental abilities • team members
<i>Business plans</i> may include:	<ul style="list-style-type: none"> • cash flow projections • long-term budgets/plans • operational plans • short-term budgets/plans • spreadsheet-based financial projections • targets or key performance indicators for production, productivity, wastage, sales, income and expenditure

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Management and Leadership - Management
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Co-requisite units

Co-requisite units	

BSBMGT402A Implement operational plan

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to implement the operational plan by monitoring and adjusting operational performance, producing short term plans for the department/section, planning and acquiring resources and providing reports on performance as required.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>Frontline managers are actively engaged in planning activities to achieve the measurable, stated objectives of the team and the organisation. This key role is carried out to provide safe, efficient and effective products and services to customer satisfaction within the organisation's productivity and profitability plans.</p> <p>At this level, work will normally be carried out within routine and non routine methods and procedures, which require planning, evaluation, leadership and guidance of others.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units	

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Implement operational plan	<p>1.1. Collate, analyse and organise details of resource requirements in consultation with relevant personnel, colleagues and specialist resource managers</p> <p>1.2. Implement operational plans to contribute to the achievement of organisation's performance/business plan</p> <p>1.3. Identify and use key performance indicators (KPIs) to monitor operational performance</p> <p>1.4. Undertake contingency planning and consultation processes</p> <p>1.5. Provide assistance in the development and presentation of proposals for resource requirements in line with operational planning processes</p>
2. Implement resource acquisition	<p>2.1. Recruit and induct employees within organisation's policies, practices and procedures</p> <p>2.2. Implement plans for acquisition of physical resources and services within organisation's policies, practices and procedures and in consultation with relevant personnel</p>
3. Monitor operational performance	<p>3.1. Monitor performance systems and processes to assess progress in achieving profit/productivity plans and targets</p> <p>3.2. Analyse and use budget and actual financial information to monitor profit/productivity performance</p> <p>3.3. Identify unsatisfactory performance and take prompt action to rectify the situation according to organisational policies</p> <p>3.4. Provide mentoring, coaching and supervision to support individuals and teams to use resources effectively, economically and safely</p> <p>3.5. Present recommendations for variation to operational plans to the designated persons/groups and gain approval</p> <p>3.6. Implement systems, procedures and records associated with performance in accordance with organisation's requirements</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- coaching and mentoring skills to provide support to colleagues
- literacy skills to access and use workplace information, and to prepare reports
- planning and organising skills to monitor performance and to sequence work of self and others to achieve planned outcomes.

Required knowledge

- principles and techniques associated with:
 - contingency planning
 - methods for monitoring and reporting on performance
 - monitoring and implementing operations and procedures
 - problem identification and methods of resolution
 - relevant budgeting and financial analysis, interpretation and reporting requirements
 - resource management systems at the tactical implementation level
 - resource planning and acquisition
 - tactical risk analysis including identification and reporting requirements.

Evidence Guide

EVIDENCE GUIDE	
The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> ability to monitor and adjust operational performance, produce short-term plans for the department or section, plan and acquire resources, and provide reports on performance as required knowledge of principles and techniques associated with monitoring and implementing operations and procedures.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> access to appropriate documentation and resources normally used in the workplace.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate review of documentation outlining contingency planning and consultation processes undertaken demonstration of techniques in managing performance evaluation of mentoring, coaching and supervision provided to support individuals and teams to use resources effectively, economically and safely.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p> <ul style="list-style-type: none"> other units from the Certificate IV in Frontline Management.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

<p><i>Resource requirements</i> may refer to:</p>	<ul style="list-style-type: none"> • goods and services to be purchased and ordered • human, physical and financial resources - both current and projected • stock requirements and requisitions
<p><i>Relevant personnel, colleagues and specialist resource managers</i> may include:</p>	<ul style="list-style-type: none"> • colleagues and specialist resource managers • managers • occupational health and safety committees and other people with specialist responsibilities • other employees • people from a wide range of social, cultural and ethnic backgrounds, and people with a range of physical and mental abilities • supervisors
<p><i>Operational plans</i> may refer to:</p>	<ul style="list-style-type: none"> • organisational plans • tactical plans developed by the department or section to detail product and service performance
<p><i>Key performance indicators</i> may refer to:</p>	<ul style="list-style-type: none"> • measures for monitoring or evaluating the efficiency or effectiveness of a system, and which may be used to demonstrate accountability and to identify areas for improvements
<p><i>Contingency planning</i> may refer to:</p>	<ul style="list-style-type: none"> • contracting out or outsourcing human resources and other functions or tasks • diversification of outcomes • finding cheaper or lower quality raw materials and consumables • increasing sales or production • recycling and re-use • rental, hire purchase or alternative means of procurement of required materials, equipment and stock • restructuring of organisation to reduce labour

RANGE STATEMENT	
	<ul style="list-style-type: none"> costs • risk identification, assessment and management processes • seeking further funding • strategies for reducing costs, wastage, stock or consumables • succession planning
<i>Consultation processes</i> may refer to:	<ul style="list-style-type: none"> • mechanisms used to provide feedback to the work team in relation to outcomes of consultation • meetings, interviews, brainstorming sessions, email/intranet communications, newsletters or other processes and devices which ensure that all employees have the opportunity to contribute to team and individual operational plans
<i>Organisation's policies, practices and procedures</i> may include:	<ul style="list-style-type: none"> • organisational culture • Standard Operating Procedures • organisational guidelines which govern and prescribe operational functions, such as the acquisition and management of human and physical resources • undocumented practices in line with organisational operations
<i>Performance systems and processes</i> may refer to:	<ul style="list-style-type: none"> • informal systems used by frontline managers for the work team in the place of existing organisation-wide systems • formal processes within the organisation to measure performance, such as: <ul style="list-style-type: none"> • feedback arrangements • individual and teamwork plans • KPIs • specified work outcomes
<i>Designated persons/groups</i> may include:	<ul style="list-style-type: none"> • other affected work groups or teams and groups designated in workplace policies and procedures • those who have the authority to make decisions and/or recommendations about operations such as workplace supervisors, other managers
<i>Systems, procedures and records</i>	<ul style="list-style-type: none"> • databases and other recording mechanisms for ensuring records are kept in accordance with

RANGE STATEMENT

may include:

- organisational requirements
- individual and team performance plans
- organisational policies and procedures relative to performance

Unit Sector(s)

Unit sector

Competency field

Competency field

Management and Leadership - Management

Co-requisite units

Co-requisite units

BSBMGT403A Implement continuous improvement

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to implement the organisation's continuous improvement systems and processes. Particular emphasis is on using systems and strategies to actively encourage the team to participate in the process, monitoring and reviewing performance, and identifying opportunities for further improvements.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>Frontline managers have an active role in implementing the continuous improvement process to achieve the organisation's objectives. Their position, closely associated with the creation and delivery of products and services, means that they have an important role in influencing the ongoing development of the organisation.</p> <p>At this level, work will normally be carried out within routine and non routine methods and procedures, which require planning and evaluation, and leadership and guidance of others.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Implement continuous improvement systems and processes	1.1. Implement <i>systems</i> to ensure that individuals and teams are actively encouraged and supported to <i>participate in decision making processes</i> , assume responsibility and exercise initiative 1.2. Communicate the organisation's <i>continuous improvement processes</i> to individuals and teams, and obtain feedback 1.3. Ensure effective <i>mentoring and coaching</i> allows individuals and teams to implement the organisation's continuous improvement processes
2. Monitor and review performance	2.1. Use the organisation's systems and <i>technology</i> to monitor and review progress and to identify ways in which planning and operations could be improved 2.2. Improve <i>customer service</i> through continuous improvement techniques and processes 2.3. Formulate and communicate recommendations for adjustments to those who have a role in their development and implementation
3. Provide opportunities for further improvement	3.1. Implement <i>processes to ensure that team members are informed of savings and productivity/service improvements</i> in achieving the business plan 3.2. Document work performance to aid the identification of further opportunities for improvement 3.3. Manage records, reports and recommendations for improvement within the organisation's systems and processes

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication skills to:
 - coach and mentor team members
 - gain the commitment of individuals and teams to continuously improve
- innovation skills to design better ways of performing work.

Required knowledge

- principles and techniques associated with:
 - benchmarking
 - best practice
 - change management
 - continuous improvement systems and processes
 - quality systems.

Evidence Guide

EVIDENCE GUIDE	
<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> • taking active steps to implement, monitor and adjust plans, processes and procedures to improve performance • supporting others to implement the continuous improvement system/processes, and to identify and report opportunities for further improvement • knowledge of principles and techniques associated with continuous improvement systems and processes.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> • access to appropriate documentation and resources normally used in the workplace.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> • assessment of written reports • direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate • observation of presentations • oral or written questioning to assess knowledge of principles and techniques associated with change management • review of how the organisation's continuous improvement processes was communicated to individuals and teams • review of documentation of work performance.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p> <ul style="list-style-type: none"> • other units from the Certificate IV in Frontline Management.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

<i>Systems</i> may refer to:	<ul style="list-style-type: none"> • forums, meetings • newsletters and reports • organisational policies and procedures • web-based communication devices
<i>Participation in decision making processes</i> may include:	<ul style="list-style-type: none"> • feedback in relation to outcomes of the consultative process • processes which ensures all employees have the opportunity to contribute to organisational issues
<i>Continuous improvement processes</i> may include:	<ul style="list-style-type: none"> • cyclical audits and reviews of workplace, team and individual performance • evaluations and monitoring of effectiveness • implementation of quality systems, such as International Standardization for Organization (ISO) • modifications and improvements to systems, processes, services and products • policies and procedures which allow the organisation to systematically review and improve the quality of its products, services and procedures • seeking and considering feedback from a range of stakeholders
<i>Mentoring and coaching</i> may refer to:	<ul style="list-style-type: none"> • providing assistance with problem-solving • providing feedback, support and encouragement • teaching another member of the team, usually focusing on a specific work task or skill
<i>Technology</i> may include:	<ul style="list-style-type: none"> • computerised systems and software such as databases, project management and word processing • telecommunications devices • any other technology used to carry out work roles and responsibilities

RANGE STATEMENT	
<i>Customer service</i> may be:	<ul style="list-style-type: none"> • internal or external • to existing, new or potential clients
<i>Processes to ensure that team members are informed of savings and productivity/service improvements</i> may refer to:	<ul style="list-style-type: none"> • email/intranet, newsletters or other communication devices • newsletters and bulletins • staff reward mechanisms • team meetings

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Management and Leadership - Management
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Co-requisite units

Co-requisite units	

BSBWOR401A Establish effective workplace relationships

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to collect, analyse and communicate information and to use that information to develop and maintain effective working relationships and networks, with particular regard to communication and representation.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>Frontline managers play an important role in developing and maintaining positive relationships in internal and external environments so that customers, suppliers and the organisation achieve planned outputs and outcomes. They play a prominent part in motivating, mentoring, coaching and developing team cohesion through providing leadership for the team and forming the bridge between the management of the organisation and team members.</p> <p>At this level, work will normally be carried out within routine and non routine methods and procedures, which require planning and evaluation, and leadership and guidance of others.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Collect, analyse and communicate information and ideas	1.1. Collect relevant <i>information</i> from appropriate sources and analyse and share with the work team to improve work performance 1.2. Communicate ideas and information in a manner which is appropriate and sensitive to the cultural and social diversity of the audience and any specific needs 1.3. Implement <i>consultation processes</i> to encourage employees to contribute to issues related to their work, and promptly relay feedback to the work team in regard to outcomes 1.4. Seek and value contributions from internal and external sources in developing and refining new ideas and approaches 1.5. Implement <i>processes</i> to ensure that issues raised are resolved promptly or referred to <i>relevant personnel</i> as required
2. Develop trust and confidence	2.1. Treat all internal and external contacts with integrity, respect and empathy 2.2. Use the <i>organisation's social, ethical and business standards</i> to develop and maintain effective relationships 2.3. Gain and maintain the trust and confidence of <i>colleagues, customers and suppliers</i> through competent performance 2.4. Adjust interpersonal styles and methods to meet organisation's social and cultural environment 2.5. Encourage other members of the work team to follow examples set, according to <i>organisation's policies and procedures</i>
3. Develop and maintain networks and relationships	3.1. Use <i>networks</i> to identify and build relationships 3.2. Use networks and other work relationships to provide identifiable benefits for the team and organisation
4. Manage difficulties into positive outcomes	4.1. Identify and analyse difficulties, and take action to rectify the situation within the requirements of the organisation and relevant legislation 4.2. Guide and support colleagues to resolve work difficulties 4.3. Regularly review and improve <i>workplace outcomes</i>

ELEMENT	PERFORMANCE CRITERIA
	<p>in consultation with relevant personnel</p> <p>4.4. Manage <i>poor work performance</i> within the organisation's processes</p> <p>4.5. Manage conflict constructively within the organisation's processes</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- coaching and mentoring skills to provide support to colleagues
- literacy skills to research, analyse, interpret and report information
- relationship management and communication skills to:
 - deal with people openly and fairly
 - forge effective relationships with internal and/or external people, and to develop and maintain these networks
 - gain the trust and confidence of colleagues
 - respond to unexpected demands from a range of people
 - use supportive and consultative processes effectively.

Required knowledge

- relevant legislation from all levels of government that affects business operation, especially in regard to occupational health and safety (OHS), and environmental issues, equal opportunity, industrial relations and anti-discrimination
- theory associated with managing work relationships to achieve planned outcomes:
 - developing trust and confidence
 - maintaining consistent behaviour in work relationships
 - understanding the cultural and social environment
 - identifying and assessing interpersonal styles
 - establishing, building and maintaining networks
 - identifying and resolving problems
 - resolving conflict
 - managing poor work performance
 - monitoring, analysing and introducing ways to improve work relationships.

Evidence Guide

EVIDENCE GUIDE	
<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> • range of methods and techniques for communicating information and ideas to a range of stakeholders • range of methods and techniques for developing positive work relationships that build trust and confidence in the team • accessing and analysing information to achieve planned outcomes • techniques for resolving problems and conflicts and dealing with poor performance • knowledge of the theory associated with managing work relationships to achieve planned outcomes.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> • access to appropriate documentation and resources normally used in the workplace.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> • demonstration of techniques in managing poor performance and communicating effectively • direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate • observation of performance in role plays • observation of presentations • oral or written questioning to assess knowledge of relevant legislation • review of consultation processes implemented to encourage employees to contribute to issues related to their work • review of documentation outlining reviewing of workplace outcomes.
Guidance information for	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended,</p>

EVIDENCE GUIDE**assessment**

for example:

- other units from the Certificate IV in Frontline Management.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

<p><i>Information</i> may include:</p>	<ul style="list-style-type: none"> • data appropriate to work roles and organisational policies that is shared and retrieved in writing or verbally, electronically or manually such as: <ul style="list-style-type: none"> • archived, filed and historical background data • individual and team performance data • marketing and customer related data • planning and organisational documents including the outcomes of continuous improvement and quality assurance • policies and procedures
<p><i>Consultation processes</i> may include:</p>	<ul style="list-style-type: none"> • feedback to the work team and relevant personnel in relation to outcomes of the consultation process • opportunities for all employees to contribute to ideas and information about organisational issues
<p><i>Processes</i> to ensure that issues raised are resolved promptly or referred may include:</p>	<ul style="list-style-type: none"> • conducting informal meetings • coordinating surveys or questionnaires • distributing newsletters or reports • exchanging informal dialogue with relevant personnel • participating in planned organisational activities
<p><i>Relevant personnel</i> may include:</p>	<ul style="list-style-type: none"> • managers • OHS committee and other people with specialist responsibilities • other employees • supervisors • union representatives/groups
<p><i>Organisation's social, ethical and business standards</i> may refer to:</p>	<ul style="list-style-type: none"> • implied standards such as honesty and respect relative to the organisational culture and generally accepted within the wider

RANGE STATEMENT	
	<ul style="list-style-type: none"> community • rewards and recognition for high performing staff • standards expressed in legislation and regulations such as anti-discrimination legislation • written standards such as those expressed in: <ul style="list-style-type: none"> • code of workplace conduct/behaviour • dress code • policies • statement of workplace values • vision and mission statements
<i>Colleagues, customers and suppliers</i> may include:	<ul style="list-style-type: none"> • both internal and external contacts • employees at the same level and more senior managers • people from a wide variety of social, cultural and ethnic backgrounds • team members
<i>Organisation's policies and procedures</i> may refer to:	<ul style="list-style-type: none"> • Materials Safety Data Sheets • organisational tasks and activities undertaken to meet performance outcomes • sets of accepted actions approved by the organisation • Standard Operating Procedures
<i>Networks</i> may be:	<ul style="list-style-type: none"> • established structures or unstructured arrangements and may include business or professional associations • informal or formal and with individuals or groups • internal and/or external
<i>Workplace outcomes</i> may include:	<ul style="list-style-type: none"> • OHS processes and procedures • performance of the work team
<i>Poor work performance</i> may refer to:	<ul style="list-style-type: none"> • individual team members • organisation as a whole • self • whole work team

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Industry Capability - Workplace Effectiveness
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Co-requisite units

Co-requisite units		

BSBWOR402A Promote team effectiveness

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to promote teamwork. It involves developing team plans to meet expected outcomes, leading the work team, and proactively working with the management of the organisation.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>Frontline managers have an important leadership role in the development of efficient and effective work teams. They play a prominent part in team planning, supervising the performance of the team and developing team cohesion. They provide leadership for the team and bridge the gap between the management of the organisation and the team members. As such they must 'manage up' as well as manage their team/s.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan to achieve team outcomes	1.1. Identify, establish and document team purpose, roles, responsibilities, goals, plans and objectives in consultation with team members 1.2. Support team members in meeting expected outcomes
2. Develop team cohesion	2.1. Provide opportunities for input of team members into planning, decision making and operational aspects of work team 2.2. Encourage and support team members to take responsibility for own work and to assist each other in undertaking required roles and responsibilities 2.3. Provide feedback to team members to encourage, value and reward individual and team efforts and contributions 2.4. Recognise and address issues, concerns and problems identified by team members or refer to relevant persons as required
3. Participate in and facilitate work team	3.1. Actively encourage team members to participate in and take responsibility for team activities and communication processes 3.2. Give the team support to identify and resolve problems which impede its performance 3.3. Ensure own contribution to work team serves as a role model for others and enhances the organisation's image within the work team, the organisation and with clients/customers
4. Liaise with management	4.1. Maintain open communication with line manager/management at all times 4.2. Communicate information from line manager/management to the team 4.3. Communicate unresolved issues, concerns and problems raised by the team/team members to line manager/management and ensure follow-up action is taken 4.4. Communicate unresolved issues, concerns and problems related to the team/team members raised by line managers/management to the team and ensure follow-up to action is taken

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication skills to:
 - boost team morale
 - deal with team conflict
 - deliver messages from management
 - facilitate discussion
 - mentor and coach
- leadership skills
- planning and organising skills.

Required knowledge

- organisational goals, objectives and plans
- organisational policy and procedures framework
- organisational structure, including organisational chart
- principles and techniques associated with:
 - delegation and work allocation
 - goal setting
 - group dynamics and processes
 - individual behaviour and difference
 - leadership
 - motivation
 - negotiation
 - planning.

Evidence Guide

EVIDENCE GUIDE	
The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> teamwork plan with details of how it was generated and how it will be monitored so that team goals can be met techniques in communicating information, dealing with team conflict and resolving issues knowledge of organisational goals, objectives and plans.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> access to appropriate documentation and resources normally used in the workplace.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> analysis of responses to case studies and scenarios direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate observation of demonstrated techniques in working with team dynamics observation of performance in role plays oral or written questioning to assess knowledge of principles and techniques associated with group dynamics and processes evaluation of opportunities provided for input of team members into planning, decision making and operational aspects of work team review of feedback provided to team members review of teamwork plan.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p> <ul style="list-style-type: none"> other units from the Certificate IV in Frontline

EVIDENCE GUIDE	
	Management.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

<p><i>Team purpose, roles, responsibilities, goals, plans and objectives</i> may include:</p>	<ul style="list-style-type: none"> • action plans, business plans and operational plans linked to strategic plans • expected outcomes and outputs • goals for individuals and the work team • individual and team performance plans and key performance indicators • occupational health and safety (OHS) responsibilities
<p><i>Consultation</i> may include:</p>	<ul style="list-style-type: none"> • attending meetings, interviews, brainstorming sessions • using email/intranet communications, newsletters or other processes and devices which ensure that all employees have the opportunity to contribute to team and individual effectiveness • using mechanisms to provide feedback to the work team in relation to consultation outcomes
<p><i>Responsibility for own work</i> may involve:</p>	<ul style="list-style-type: none"> • individual and joint actions • individuals and teams
<p><i>Feedback</i> may refer to:</p>	<ul style="list-style-type: none"> • formal/informal gatherings between team members where there is communication on work related matters • informal communication of ideas and thoughts on specific tasks, outcomes, decisions, issues or behaviours
<p><i>Relevant persons</i> may include:</p>	<ul style="list-style-type: none"> • colleagues • direct superior or other management representatives • OHS committees and other people with specialist responsibilities
<p><i>Communication</i> may include:</p>	<ul style="list-style-type: none"> • face-to-face • formal/informal interaction

RANGE STATEMENT	
	<ul style="list-style-type: none"> • verbal, written or electronic communication
<i>Line manager/management</i> may refer to:	<ul style="list-style-type: none"> • direct superior or other management representatives

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Management and Leadership - Management
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Co-requisite units

Co-requisite units		

BSBCUS501C Manage quality customer service

Modification History

Release	Comments
Release 1	<p>New release of this Qualification released with <i>version 6 of BSB07 Business Services Training Package</i>.</p> <p>Revised unit. Required skills updated to focus on learning and development practices and compliance with policy and procedures.</p>

Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to develop strategies to manage organisational systems that ensure products and services are delivered and maintained to standards agreed by the organisation.

Operators may have staff involved in delivering customer service and are responsible for the quality of their work. In many instances the work will occur within the organisation's policies and procedures framework. At this level, the exercise of considerable discretion and judgement, using a range of problem solving and decision making strategies, will be required.

Application of the Unit

Many managers are involved in ensuring that products and services are delivered and maintained to standards agreed by the organisation.

Licensing/Regulatory Information

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Element	Performance Criteria
<i>Elements describe the essential outcomes of a unit of competency.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.</i>

Elements and Performance Criteria

1. Plan to meet internal and external customer requirements	<p>1.1 Investigate, identify, assess, and include the needs of customers in planning processes</p> <p>1.2 Ensure plans achieve the quality, time and cost specifications agreed with customers</p>
2. Ensure delivery of quality products and services	<p>2.1 Deliver products and services to customer specifications within organisation's business plan</p> <p>2.2 Monitor team performance to consistently meet the organisation's quality and delivery standards</p> <p>2.3 Assist colleagues to overcome difficulty in meeting customer service standards</p>
3. Monitor, adjust and review customer service	<p>3.1 Develop and use strategies to monitor progress in achieving product and/or service targets and standards</p> <p>3.2 Develop and use strategies to obtain customer feedback to improve the provision of products and services</p> <p>3.3. Develop, procure and use resources effectively to provide quality products and services to customers</p> <p>3.4 Make decisions to overcome problems and to adapt customer services, products and service delivery in consultation with appropriate individuals and groups</p> <p>3.5 Manage records, reports and recommendations within the organisation's systems and processes</p>

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

- analytical skills to identify trends and positions of products and services
- communication skills to:
 - coach and mentor staff and colleagues
 - monitor and advise on customer service strategies
- literacy skills to:
 - edit and proofread texts to ensure clarity of meaning and accuracy of grammar and punctuation
 - prepare general information and papers according to target audience
 - read and understand a variety of texts
- problem-solving skills to:
 - deal with customer enquiries or complaints
 - deal with complex and non-routine difficulties
- technology skills to select and use technology appropriate to a task
- self-management skills to:
 - comply with policies and procedures
 - consistently evaluate and monitor own performance
 - seek learning opportunities.

Required knowledge

- key provisions of relevant legislation from all levels of government that may affect aspects of business operations, such as:
 - anti-discrimination legislation
 - Australian consumer law
 - ethical principles
 - codes of practice
 - privacy laws
 - financial legislation
 - occupational health and safety (OHS)
- organisational policy and procedures for customer service including handling customer complaints
- service standards and best practice models
- public relations and product promotion
- techniques for dealing with customers, including customers with specific needs
- techniques for solving complaints including the principles and techniques involved in the management and organisation of:
 - customer behaviour
 - customer needs research
 - customer relations
 - ongoing product and/or service quality
 - problem identification and resolution

- quality customer service delivery
- record keeping and management methods
- strategies for monitoring, managing and introducing ways to improve customer service relationships
- strategies to obtain customer feedback.

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> • plans, policies or procedures for delivering quality customer service • demonstrated techniques in solving complex customer complaints and system problems that lead to poor customer service • knowledge of techniques for solving complaints.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> • access to appropriate documentation and resources normally used in the workplace.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> • assessment of written reports • demonstration of techniques • direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate • observation of performance in role plays • evaluation of leadership, supervision, coaching and mentoring used to assist colleagues to overcome difficulty in meeting customer service standards • review of strategies developed and used to monitor progress in achieving product and/or service targets and standards • review of records, reports and recommendations about managing customer service.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Customers may be:	<ul style="list-style-type: none"> • Board members • clients, purchasers of services • co-workers, peers and fellow frontline managers • members of the general public who make contact with the organisation, such as prospective purchasers of services • potential funding bodies • supervisors • suppliers of goods and services and contractors providing goods and services.
Quality may refer to:	<ul style="list-style-type: none"> • characteristics of a product, system, service or process that meet the requirements of customers and interested parties.
Products and services may include:	<ul style="list-style-type: none"> • either products or services • goods • ideas • infrastructure • private or public sets of benefits.
Strategies may refer to:	<ul style="list-style-type: none"> • databases and other controls to record and compare data over time • electronic feedback mechanisms using intranet, internet and email • feedback forms and other devices to enable communication from customers • long-term or short-term plans for monitoring achievement and evaluating effectiveness • policies and procedures • questionnaires, survey and interviews • training and development activities.
Resources may include:	<ul style="list-style-type: none"> • buildings/facilities • equipment • finance • information • people • power/energy

	<ul style="list-style-type: none">• technology• time.
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Unit Sector(s)

Stakeholder Relations – Customer Service

Custom Content Section

Not applicable.

BSBFIM501A Manage budgets and financial plans

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to undertake financial management within a work team in an organisation. This includes planning and implementing financial management approaches, supporting team members whose role involves aspects of financial operations, monitoring and controlling finances, and reviewing and evaluating effectiveness of financial management processes in line with the financial objectives of the work team and the organisation.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>This unit addresses the requirement for managers to ensure that financial resources are used effectively. This is done by ensuring access to budget/s and ongoing monitoring expenditure against the budget/s.</p> <p>The unit applies to managers working in small and large business environments and not for profit organisations.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units	

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan financial management approaches	1.1. Access <i>budget/financial plans</i> for the work team 1.2. Clarify budget/financial plans with <i>relevant personnel</i> within the organisation to ensure that documented outcomes are achievable, accurate and comprehensible 1.3. Negotiate any changes required to be made to budget/financial plans with relevant personnel within the organisation 1.4. Prepare <i>contingency plans</i> in the event that initial plans need to be varied
2. Implement financial management approaches	2.1. Disseminate relevant details of the agreed budget/financial plans to team members 2.2. Provide <i>support</i> to ensure that team members can competently perform <i>required roles</i> associated with the management of finances 2.3. Determine and access <i>resources and systems</i> to manage financial management processes within the work team
3. Monitor and control finances	3.1. Implement <i>processes</i> to monitor actual expenditure and to control costs across the work team 3.2. Monitor expenditure and costs on an agreed cyclical basis to identify cost variations and expenditure overruns 3.3. Implement, monitor and modify contingency plans as required to maintain financial objectives 3.4. <i>Report</i> on budget and expenditure in accordance with organisational protocols
4. Review and evaluate financial management processes	4.1. Collect and collate for analysis, <i>data and information on the effectiveness of financial management processes</i> within the work team 4.2. Analyse data and information on the effectiveness of financial management processes within the work team and identify, document and recommend any improvements to existing processes 4.3. Implement and monitor agreed improvements in line with financial objectives of the work team and the organisation

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- numeracy skills to read and understand a budget and to update a budget
- technology skills to use software associated with financial record keeping.

Required knowledge

- basic accounting principles
- organisational requirements related to financial management
- relevant legislation and current requirements of the Australian Taxation Office, including GST
- requirements for organisational record keeping and auditing
- principles and techniques involved in:
 - budgeting
 - cash flows
 - electronic spreadsheets
 - GST
 - ledgers and financial statements
 - profit and loss statements.

Evidence Guide

EVIDENCE GUIDE	
<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> financial skills required to work with and interpret budgets, ageing summaries, cash flow, petty cash, GST, and profit and loss statements knowledge of the record keeping requirements for the ATO and for auditing purposes.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> access to appropriate documentation and resources normally used in the workplace.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> assessment of written reports indicating broad knowledge of managing budgets and managing financial resources in the organisation demonstration of techniques using financial record keeping software direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate oral or written questioning to assess knowledge of requirements for organisational record keeping and auditing review of contingency plans review of identification of cost variations and expenditure overruns evaluation of documentation reporting on budget and expenditure review of documentation identifying and recommending improvements to financial management processes.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p>

EVIDENCE GUIDE

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| | <ul style="list-style-type: none">• other units from the Diploma of Management. |
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Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

<p><i>Budget/financial plans</i> may include:</p>	<ul style="list-style-type: none"> • cash flow projections • long-term budgets/plans • operational plans • short-term budgets/plans • spreadsheet-based financial projections • targets or key performance indicators for production, productivity, wastage, sales, income and expenditure
<p><i>Relevant personnel</i> may include:</p>	<ul style="list-style-type: none"> • financial managers, accountants or financial controllers • supervisors, other frontline managers
<p><i>Contingency plans</i> may include:</p>	<ul style="list-style-type: none"> • contracting out or outsourcing human resources and other functions or tasks • diversification of outcomes • finding cheaper or lower quality raw materials and consumables • increasing sales or production • recycling and re-using • rental, hire purchase or alternative means of procurement of required materials, equipment and stock • restructuring of organisation to reduce labour costs • risk identification, assessment and management processes • seeking further funding • strategies for reducing costs, wastage, stock or consumables • succession planning
<p><i>Support</i> may include:</p>	<ul style="list-style-type: none"> • access to specialist advice • documentation of procedures • help desk or identified experts within the organisation • information briefings or sessions

RANGE STATEMENT	
	<ul style="list-style-type: none"> • intranet-based information • training including mentoring, coaching and shadowing
Required roles may include:	<ul style="list-style-type: none"> • arranging for use of corporate credit cards • banking • debt collection • ensuring security, accuracy and currency of financial operations • invoicing clients, customers and consumers • maintaining journals, ledgers and other record keeping systems • maintaining petty cash system • purchasing and procurement • wages and salaries payments and record keeping
Resources and systems may include:	<ul style="list-style-type: none"> • hardware and software • human, physical or financial resources • record keeping systems (electronic and paper-based) • specialist advice or support
Processes to monitor actual expenditure and to control costs across the work team include:	<ul style="list-style-type: none"> • reporting of: <ul style="list-style-type: none"> • assets • consumables • equipment • expenditure • income • stock • wastage
Reporting may include data from:	<ul style="list-style-type: none"> • bank statements • credit card statements • financial reports • invoices and receipts • ledgers and journals • logs • petty cash records • spreadsheet-based records
Data and information on the effectiveness of financial management processes may include records (paper-based and	<ul style="list-style-type: none"> • bank account records • cash flow data • contracts

RANGE STATEMENT

electronic) related to:

- credit card receipts
- employee timesheets
- files of paid purchase and service invoices
- income and expenditure
- insurance reports
- invoices
- job costings
- petty cash receipts
- quotations
- taxation records
- wages/salaries books

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Management and Leadership - Management
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Co-requisite units

Co-requisite units	

BSBINM501A Manage an information or knowledge management system

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to organise learning to use an information or knowledge management system and to manage the use of the system.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>This unit applies to managers who have responsibility for seeing that key information and corporate knowledge are retained, accessible to others and improve business outcomes.</p> <p>The unit does not address the requirement to select the technical system (software or hardware), which is seen as the role of an information technology specialist, although in some smaller organisations this may be a part of the manager's role.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units	

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Organise learning to use information or knowledge management system	1.1. Identify learning needs of <i>relevant personnel</i> and <i>stakeholders</i> for input into, and use of, <i>an information or knowledge management system</i> 1.2. Identify and secure human, financial and physical resources required for <i>learning activities</i> to use an information or knowledge management system 1.3. Organise and facilitate learning activities 1.4. Promote and support use of the system throughout the organisation 1.5. Monitor and document effectiveness of learning activities
2. Manage use of information or knowledge management system	2.1. Ensure implementation of <i>policies and procedures for the information or knowledge management system</i> are monitored for compliance, effectiveness and efficiency 2.2. Address implementation issues and problems as they arise 2.3. Monitor integration and alignment with data and information systems 2.4. Collect information on achievement of <i>performance measures</i> 2.5. Manage contingencies such as system failure or technical difficulties by accessing technical specialist help as required
3. Review use of information or knowledge management system	3.1. Analyse effectiveness of system and report on strengths and limitations of the system 3.2. Review business and operational plan and determine how effectively the system is contributing to intended outcomes 3.3. Make recommendations for improvement to system, policy or work practices

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- analytical and problem-solving skills to ensure the system is working in accordance with organisational expectations and to deal with contingencies
- technology skills to work with and manage the use of the information or knowledge management system.

Required knowledge

- legislation, codes of practice and national standards, for example:
 - privacy and confidentiality legislation
 - freedom of information legislation
 - AS 5037:2005 Knowledge management - A guide
- organisational policies and procedures, for example:
 - records management
 - information management
 - customer service
 - commercial confidentiality
- organisational operations, and existing data and information systems.

Evidence Guide

EVIDENCE GUIDE	
<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> analysis of the strengths and weaknesses of information or knowledge management system/s and evaluation of suitability for a particular work or organisational context knowledge of relevant legislation, codes of practice and national standards.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> access to system access to system user feedback.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> assessment of written reports reviewing and evaluating information or knowledge management systems direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate observation of presentations oral or written questioning to assess knowledge of relevant organisational policies and procedures review of identified learning needs personnel and stakeholders regarding the information or knowledge management system evaluation of monitoring and documentation about the effectiveness of learning activities analysis documentation reporting on the strengths and limitations of the system review of recommendations made for improvements to the system, policy or work practices.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended,</p>

EVIDENCE GUIDE

for example:

- other units from the Diploma of Management.

Range Statement

RANGE STATEMENT	
<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
<p><i>Relevant personnel</i> include:</p>	<ul style="list-style-type: none"> • managers, leaders, supervisors and coordinators • owners • staff, team members and colleagues
<p><i>Stakeholders</i> include:</p>	<ul style="list-style-type: none"> • clients and customers • employee representatives • funding bodies • industry, professional and trade associations • regulatory bodies and authorities • sponsors • tenderers, suppliers and contractors
<p><i>Information or knowledge management</i> is defined as:</p>	<ul style="list-style-type: none"> • equipment, strategies, methods, activities and techniques used formally and informally by individuals and the organisation to identify, collect, organise, store, retrieve, analyse, share and draw on information and knowledge valuable to the work of the organisation
<p><i>An information or knowledge management system:</i></p>	<ul style="list-style-type: none"> • comprises policies, protocols, procedures and practices to manage information or knowledge within the organisation and among relevant stakeholders
<p><i>Learning activities</i> include:</p>	<ul style="list-style-type: none"> • coaching and mentoring programs • help desks • information sessions, briefings, workshops and training programs • paper-based or electronic (including intranet) learning opportunities • use of expert workers such as coaches and mentors to help other personnel use the system
<p><i>Policies and procedures for the information or knowledge management system</i> cover:</p>	<ul style="list-style-type: none"> • complying with legislative requirements (such as privacy, confidentiality and defamation requirements) and other policies and procedures • content guidelines

RANGE STATEMENT	
	<ul style="list-style-type: none"> • ensuring accuracy and relevance of knowledge input into the system • mechanisms, formats and styles of input to system, including appropriate alternative formats for people with a disability • permissions for input • removing out-of-date, inaccurate and content that is no longer relevant • selecting, maintaining and disposing of knowledge in the system • sharing knowledge in the system
<i>Performance measures</i> include:	<ul style="list-style-type: none"> • key performance indicators • other systems and measures to enable assessment of how, when, where and why outcomes are being achieved • performance objectives • performance standards (including codes of conduct) • qualitative or quantitative mechanisms to measure individual performance

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Management and Leadership - Management
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Co-requisite units

Co-requisite units	

BSBINN502A Build and sustain an innovative work environment

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to create an environment that enables and supports the application of innovative practice.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>This unit applies to individuals working in leadership or management roles in any industry or community context. The individual could be employed by the organisation, but may also be an external contractor, the leader of a cross organisation team or of a self formed team of individuals. The work group could be permanent or temporary in nature.</p> <p>The unit focuses on the skills and knowledge required to develop and implement a holistic approach to the integration of innovation across all areas of work practice. It also acknowledges the importance of wider contextual evaluation for potential innovations to ensure their value and benefit.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Lead innovation by example	1.1. Make innovation an integral part of <i>leadership and management activities</i> 1.2. Demonstrate positive reception of ideas from others and provide constructive advice 1.3. Establish and maintain relationships based on mutual respect and trust 1.4. Take considered <i>risks</i> to open up opportunities for innovation 1.5. Regularly evaluate own approaches for consistency with the wider organisational or project context
2. Establish work practices that support innovation	2.1. Consult on and establish <i>working conditions</i> that reflect and encourage innovative practice 2.2. Introduce and maintain <i>workplace procedures</i> that foster innovation and allow for rigorous <i>evaluation of innovative ideas</i> 2.3. Facilitate and participate in <i>collaborative work arrangements</i> to foster innovation 2.4. Build and lead teams to work in <i>ways that maximise opportunities for innovation</i>
3. Promote innovation	3.1. Acknowledge suggestions, improvements and innovations from all colleagues 3.2. Find appropriate <i>ways of celebrating and promoting innovation</i> 3.3. Promote and reinforce the value of innovation according to the vision and objectives of the organisation or project 3.4. Promote and support the evaluation of innovative ideas within the wider organisational or project context
4. Create a physical environment which supports innovation	4.1. Evaluate the <i>impact of the physical environment</i> in relation to innovation 4.2. Collaborate with colleagues about ideas for enhancing the physical work environment before taking action 4.3. Consider potential for supporting innovation when selecting physical resources and equipment 4.4. Design, fit-out and decorate workspaces to encourage creative mindsets, collaborative working and the development of positive workplace relationships

ELEMENT	PERFORMANCE CRITERIA
5. Provide learning opportunities	5.1. Pro-actively share relevant information, knowledge and skills with colleagues 5.2. Provide or encourage <i>formal and informal learning opportunities</i> to help develop the skills needed for innovation 5.3. Create opportunities in which individuals can learn from the experience of others

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication, consultation and negotiation skills to model and lead, open and collaborative relationships
- comprehension skills to interpret and develop information that may deal with complex ideas and relate to issues both within and outside a given workplace context
- planning and organisational skills to implement wide-ranging practical processes and procedures that support innovation
- problem-solving skills to assess and respond to challenges and risks around innovation at an operational management level
- self-management and learning skills to evaluate and enhance personal effectiveness, and to promote a culture of ongoing learning and development.

Required knowledge

- benefits of providing coaching and learning opportunities in relation to innovation
- concept of innovation, what it is and what it means for different people either working independently or within an organisation
- context for innovation in the relevant workplace context including core business values, overall objectives, broader environmental context and the need to ensure the value and benefit of innovative ideas and projects
- different ways of rewarding performance
- factors and tools that can motivate individuals to use creative thinking and apply innovative work practices
- legislative framework that impacts on operations in the relevant workplace context
- management principles and leadership styles, including the impact of different approaches on innovation
- typical challenges and barriers to innovation within teams and organisations, and ways of overcoming these
- ways in which workplace climate can affect individual attitudes and performance.

Evidence Guide

EVIDENCE GUIDE	
The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> establishment of procedures and practices (for a project or a workplace) which support and foster innovative work practice and include sound evaluation processes modelling of behaviour that supports innovative work practice knowledge and understanding of the role of leaders and managers in encouraging innovation, and the issues and challenges associated with building and sustaining an innovative work environment.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> involvement of a team for which the candidate provides leadership and guidance.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate evaluation of outcomes and processes from activities managed by the candidate, particularly in relation to how innovation and innovative practice was encouraged and supported oral or written questioning to assess knowledge of ways that innovation can be fostered and the typical challenges and barriers to innovation.
Guidance information for assessment	Innovation does not occur in isolation. Holistic assessment with other units relevant to the industry sector, workplace and job role is highly recommended.

Range Statement

RANGE STATEMENT	
<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
<p><i>Leadership and management activities</i> may include:</p>	<ul style="list-style-type: none"> • people management practices • planning processes • regular management meetings • review processes
<p><i>Risks</i> may include:</p>	<ul style="list-style-type: none"> • budgetary issues • challenging changes in relationships, work practices and general workplace climate • unforeseen impacts of innovative ideas
<p><i>Working conditions</i> may include:</p>	<ul style="list-style-type: none"> • family-friendly leave entitlements • flexible working hours • social leave • study leave • time provided for coming up with ideas
<p><i>Workplace procedures</i> may relate to:</p>	<ul style="list-style-type: none"> • briefing processes • client relations • performance management • project management • staff meetings • training
<p><i>Evaluation of innovative ideas</i> may relate to:</p>	<ul style="list-style-type: none"> • analysing consistency with overall goals, values or vision • assessing resource requirements and practicalities • assessing the potential to find 'champions' or supporters • evaluating the external factors that may impact on the idea • exploring the implications of ideas that may stretch or change existing ways of doing things
<p><i>Collaborative work arrangements</i> might be:</p>	<ul style="list-style-type: none"> • cross section • vertical teams • within a section • working with supplier organisations or partner

RANGE STATEMENT	
	organisations
<i>Ways that maximise opportunities for innovation</i> may relate to:	<ul style="list-style-type: none"> • collaborating • collecting data • creative thinking • future scanning • getting feedback • making suggestions • networking
<i>Ways of celebrating and promoting innovation</i> may include:	<ul style="list-style-type: none"> • congratulating the project team • ensuring management acknowledgment • providing a newsletter story about the idea • using the idea to help foster other ideas • well-planned group incentive schemes
<i>Impact of the physical environment</i> may relate to:	<ul style="list-style-type: none"> • eating areas • extent to which design or style links with declared philosophies or objectives • external areas • general ambience of the work environment • location of different people • presence and ambience of relaxation areas • style of décor • use of creative messages or images in the workplace • workspace design and décor • workstation arrangements and opportunities for interaction
<i>Formal and informal learning opportunities</i> may include:	<ul style="list-style-type: none"> • coaching • conferences • formal training courses/programs • information seminars • job rotation • mentoring • online learning

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Creativity and Innovation - Innovation
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Co-requisite units

Co-requisite units		

BSBLED501A Develop a workplace learning environment

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to encourage and support the development of a learning environment in which work and learning come together. Particular emphasis is on the development of strategies to facilitate and promote learning, and to monitor and improve learning performance.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>This unit applies to managers. All managers have a prominent role in encouraging, supporting and facilitating the development of a learning environment in which work and learning come together.</p> <p>At this level work will normally be carried out within complex and diverse methods and procedures, which require the exercise of considerable discretion and judgement, using a range of problem solving and decision making strategies.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Create learning opportunities	1.1. Identify potential formal and informal learning opportunities 1.2. Identify learning needs of individuals in relation to the needs of the team and/or enterprise, and available learning opportunities 1.3. Develop and implement learning plans as an integral part of individual and team performance plans 1.4. Develop strategies to ensure that learning plans reflect the diversity of needs 1.5. Ensure organisational procedures maximise individual and team access to, and participation in, learning opportunities 1.6. Ensure effective liaison occurs with training and development specialists and contributes to learning opportunities which enhance individual, team and organisational performance
2. Facilitate and promote learning	2.1. Develop strategies to ensure that workplace learning opportunities are used and that team members are encouraged to share their skills and knowledge to encourage a learning culture within the team 2.2. Implement organisational procedures to ensure workplace learning opportunities contribute to the development of appropriate workplace knowledge, skills and attitudes 2.3. Implement policies and procedures to encourage team members to assess their own competencies, and to identify their own learning and development needs 2.4. Share the benefits of learning with others in the team and organisation 2.5. Recognise workplace achievement by timely and appropriate recognition, feedback and rewards
3. Monitor and improve learning effectiveness	3.1. Use strategies to ensure that team and individual learning performance is monitored to determine the type and extent of any additional work-based support required, and any occupational health and safety (OHS) issues 3.2. Use feedback from individuals and teams to identify and introduce improvements in future learning arrangements 3.3. Make adjustments, negotiated with training and

ELEMENT	PERFORMANCE CRITERIA
	development specialists, for improvements to the efficiency and effectiveness of learning 3.4. Use processes to ensure that records and reports of competency are documented and maintained within the organisation's systems and procedures to inform future planning

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication skills to:
 - deal with people openly and fairly
 - encourage colleagues to share their knowledge and skills
 - gain the trust and confidence of colleagues
 - use consultation skills effectively
- literacy skills to access and use workplace information
- planning and organisational skills to facilitate, promote and monitor learning by:
 - developing learning plans
 - establishing a workplace which is conducive to learning
 - evaluating the effectiveness of learning
 - identifying learning needs
 - negotiating learning arrangements with training and development specialists
 - selecting and using work activities to create learning opportunities
 - using coaching and mentoring to support learning.

Required knowledge

- management of relationships to achieve a learning environment
- principles and techniques involved in the management and organisation of:
 - adult learning
 - coaching and mentoring
 - consultation and communication
 - improvement strategies
 - leadership
 - learning environment and learning culture
 - monitoring and reviewing workplace learning
 - problem identification and resolution
 - record keeping and management methods
 - structured learning
 - work-based learning.

Evidence Guide

EVIDENCE GUIDE	
<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> • methods for reviewing performance development needs and techniques for providing feedback on those needs • models for planning professional development • options available for professional development • knowledge of relationship management required to achieve a learning environment.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> • access to appropriate documentation and resources normally used in the workplace.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> • analysis of responses to case studies and scenarios • assessment of written reports • direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate • observation of performance in role plays • observation of presentations • oral or written questioning to assess knowledge of the principles and techniques involved in the management and organisation of adult learning • review of the development and implementation of learning plans • evaluation of how workplace achievement is recognised • review of processes used to record and report competency.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p>

EVIDENCE GUIDE

- | | |
|--|---|
| | <ul style="list-style-type: none">• other units from the Diploma of Management. |
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Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

<p><i>Learning opportunities</i> may include:</p>	<ul style="list-style-type: none"> • structured learning activities conducted outside and within the workplace such as: <ul style="list-style-type: none"> • accredited training through an independent organisation such as a state/territory OHS authority • action learning • short courses • training through a Registered Training Organisation (RTO) leading to a nationally recognised Australian Qualifications Framework (AQF) qualification or Statement of Attainment • workshops • workplace learning activities, that may also contribute to a recognised credential, such as: <ul style="list-style-type: none"> • coaching • exchange/rotation • induction • mentoring • shadowing
<p><i>Learning needs</i> may include:</p>	<ul style="list-style-type: none"> • developmental learning, for example the learning required to progress through an organisation and take on new tasks and roles • gaps between the competencies held by the employee, and the skills and knowledge required to effectively undertake workplace tasks
<p><i>Learning plans</i> may include:</p>	<ul style="list-style-type: none"> • codes of conduct • key performance indicators • negotiated agreement with individual/s • OHS requirements • performance standards • team competencies

RANGE STATEMENT	
	<ul style="list-style-type: none"> team roles and responsibilities work outputs and processes
<i>Diversity of needs</i> may include:	<ul style="list-style-type: none"> learning needs that relate to social, cultural and other types of workplace diversity, such as the need for varied communication styles and approaches
<i>Training and development specialists</i> may be:	<ul style="list-style-type: none"> internal external
<i>Encourage a learning culture</i> may refer to:	<ul style="list-style-type: none"> encouraging learning and sharing skills and knowledge across the work team and the wider organisation to develop competencies of individual team members and the team as a whole

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Management and Leadership - Management
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Co-requisite units

Co-requisite units	

BSBMGT502B Manage people performance

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to manage the performance of staff who report to them directly. Development of key result areas and key performance indicators and standards, coupled with regular and timely coaching and feedback, provide the basis for performance management.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>This unit applies to all managers and team leaders who manage people. It covers work allocation and the methods to review performance, reward excellence and provide feedback where there is a need for improvement.</p> <p>The unit makes the link between performance management and performance development, and reinforces both functions as a key requirement for effective managers.</p> <p>This is a unit that all managers/prospective managers who have responsibility for other employees should strongly consider undertaking.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Allocate work	1.1. Consult relevant groups and individuals on work to be allocated and resources available 1.2. Develop work plans in accordance with operational plans 1.3. Allocate work in a way that is efficient, cost effective and outcome focussed 1.4. Confirm <i>performance standards, Code of Conduct</i> and work outputs with relevant teams and individuals 1.5. Develop and agree <i>performance indicators</i> with relevant staff prior to commencement of work 1.6. Conduct <i>risk analysis</i> in accordance with the organisational risk management plan and legal requirements
2. Assess performance	2.1. Design <i>performance management</i> and review processes to ensure consistency with organisational objectives and policies 2.2. Train participants in the performance management and review process 2.3. Conduct performance management in accordance with organisational protocols and time lines 2.4. Monitor and evaluate performance on a continuous basis
3. Provide feedback	3.1. Provide informal feedback to staff on a regular basis 3.2. Advise relevant people where there is poor performance and take necessary actions 3.3. Provide on-the-job coaching when necessary to improve performance and to confirm <i>excellence in performance</i> 3.4. Document performance in accordance with the organisational performance management system 3.5. Conduct formal structured feedback sessions as necessary and in accordance with organisational policy
4. Manage follow up	4.1. Write and agree performance improvement and development plans in accordance with organisational policies 4.2. Seek assistance from human resources specialists where appropriate 4.3. Reinforce excellence in performance through recognition and continuous feedback

ELEMENT	PERFORMANCE CRITERIA
	<p>4.4. Monitor and coach individuals with poor performance</p> <p>4.5. Provide support services where necessary</p> <p>4.6. Counsel individuals who continue to perform below expectations and implement the disciplinary process if necessary</p> <p>4.7. <i>Terminate</i> staff in accordance with legal and organisational requirements where serious misconduct occurs or ongoing poor-performance continues</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication skills to articulate expected standards of performance, to provide effective feedback and to coach staff who need development
- risk management skills to analyse, identify and develop mitigation strategies for identified risks
- planning and organisation skills to ensure a planned and objective approach to the performance management system.

Required knowledge

- relevant legislation from all levels of government that affects business operation, especially in regard to occupational health and safety and environmental issues, equal opportunity, industrial relations and anti-discrimination
- relevant awards and certified agreements
- performance measurement systems utilised within the organisation
- unlawful dismissal rules and due process
- staff development options and information.

Evidence Guide

EVIDENCE GUIDE	
<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> • documented performance indicators and a critical description and analysis of performance management system from the workplace • techniques in providing feedback and coaching for improvement in performance • knowledge of relevant awards and certified agreements.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> • access to appropriate documentation and resources normally used in the workplace.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> • analysis of responses to case studies and scenarios • assessment of written reports • demonstration of techniques in providing feedback and coaching • direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate • review of work plans, performance indicators, risk analysis, performance management and review processes, performance improvement and development plans.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p> <ul style="list-style-type: none"> • other management units.

Range Statement

RANGE STATEMENT	
<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
<i>Performance standards</i> mean:	<ul style="list-style-type: none"> level of performance sought from an individual or group which may be expressed either quantitatively or qualitatively
<i>Code of Conduct</i> means:	<ul style="list-style-type: none"> agreed (or decreed) set of rules relating to employee behaviour/conduct with other employees or an agreed (or decreed) set of rules relating to employee behaviour/conduct with other employees or customers
<i>Performance indicators</i> mean:	<ul style="list-style-type: none"> measures against which performance outcomes are gauged
<i>Risk analysis</i> means:	<ul style="list-style-type: none"> determination of the likelihood of a negative event preventing the organisation meeting its objectives and the likely consequences of such an event on organisational performance
<i>Performance management</i> means:	<ul style="list-style-type: none"> in accordance with relevant industrial agreements process or set of processes for establishing a shared understanding of what an individual or group is to achieve, and managing and developing individuals in a way which increases the probability it will be achieved in both the short- and long-term
<i>Excellence in performance</i> means:	<ul style="list-style-type: none"> regularly and consistently exceeding the performance targets established while meeting the organisation's performance standards
<i>Termination</i> means:	<ul style="list-style-type: none"> cessation of the contract of employment between an employer and an employee, at the initiative of the employer within relevant industrial agreements

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Management and Leadership - Management
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Co-requisite units

Co-requisite units		

BSBMGT515A Manage operational plan

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to develop and monitor implementation of the operational plan to provide efficient and effective workplace practices within the organisation's productivity and profitability plans.</p> <p>Management at a strategic level requires systems and procedures to be developed and implemented to facilitate the organisation's operational plan.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>This unit applies to people who manage the work of others and operate within the parameters of a broader strategic and/or business plan. The task of the manager at this level is to develop and implement an operational plan to ensure that the objectives and strategies outlined in the strategic and/or business plan are met by work teams. However in some larger organisations operational plans may be developed by a strategic planning unit.</p> <p>At this level work will normally be carried out within complex and diverse methods and procedures, which require the exercise of considerable discretion and judgement, using a range of problem solving and decision making strategies.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Develop operational plan	<p>1.1. Research, analyse and document resource requirements and develop an operational plan in consultation with relevant personnel, colleagues and specialist resource managers</p> <p>1.2. Develop and/or implement consultation processes as an integral part of the operational planning process</p> <p>1.3. Ensure details of the operational plan include the development of key performance indicators to measure organisational performance</p> <p>1.4. Develop and implement contingency plans at appropriate stages of operational planning</p> <p>1.5. Ensure the development and presentation of proposals for resource requirements is supported by a variety of information sources and seek specialist advice as required</p> <p>1.6. Obtain approval for plan from relevant parties and ensure understanding among work teams involved</p>
2. Plan and manage resource acquisition	<p>2.1. Develop and implement strategies to ensure that employees are recruited and/or inducted within the organisation's human resources management policies and practices</p> <p>2.2. Develop and implement strategies to ensure that physical resources and services are acquired in accordance with the organisation's policies, practices and procedures</p>
3. Monitor and review operational performance	<p>3.1. Develop, monitor and review performance systems and processes to assess progress in achieving profit and productivity plans and targets</p> <p>3.2. Analyse and interpret budget and actual financial information to monitor and review profit and productivity performance</p> <p>3.3. Identify areas of under performance, recommend solutions, and take prompt action to rectify the situation</p> <p>3.4. Plan and implement systems to ensure that mentoring and coaching are provided to support individuals and teams to effectively, economically and safely use resources</p> <p>3.5. Negotiate recommendations for variations to operational plans and gain approval from designated persons/groups</p>

ELEMENT	PERFORMANCE CRITERIA
	3.6. Develop and implement systems to ensure that procedures and records associated with documenting performance are managed in accordance with organisational requirements

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- literacy skills to access and use workplace information and to write a succinct and practical plan
- technology skills to use software to produce and monitor the plan against performance indicators
- planning and organisational skills
- coaching skills to work with people with poor performance
- numeracy skills to allocate and manage financial resources.

Required knowledge

- models and methods for operational plans
- budgeting processes
- alternative approaches to improving resource usage and eliminating resource inefficiencies and waste.

Evidence Guide

EVIDENCE GUIDE	
<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> development of an operational plan with details of how it will be implemented and monitored knowledge of models and methods for operational plans.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> access to appropriate documentation and resources normally used in the workplace.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate oral or written questioning to assess knowledge of budgeting processes review of operational plan, key performance indicators and contingency plans evaluation of employee recruitment and induction strategies evaluation of processes implemented to acquire physical resources and services.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p> <ul style="list-style-type: none"> other units from the Diploma of Management.

Range Statement

RANGE STATEMENT	
<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
<p><i>Resource requirements</i> may include:</p>	<ul style="list-style-type: none"> • goods and services to be purchased and ordered • human, physical and financial resources - both current and projected • stock requirements and requisitions
<p><i>Relevant personnel, colleagues and specialist resource managers</i> may include:</p>	<ul style="list-style-type: none"> • employees at the same level or more senior managers • managers • occupational health and safety committee/s and other people with specialist responsibilities • supervisors • union or employee representatives
<p><i>Consultation processes</i> may refer to:</p>	<ul style="list-style-type: none"> • email/intranet communications, newsletters or other processes and devices which ensure that all employees have the opportunity to contribute to team and individual operational plans • mechanisms used to provide feedback to the work team in relation to outcomes of consultation • meetings, interviews, brainstorming sessions
<p><i>Operational plans</i> may also be termed:</p>	<ul style="list-style-type: none"> • action plans • annual plans • management plans • tactical plans
<p><i>Key performance indicators</i> may refer to:</p>	<ul style="list-style-type: none"> • measures for monitoring or evaluating the efficiency or effectiveness of a system which may be used to demonstrate accountability and to identify areas for improvements
<p><i>Contingency plans</i> may include:</p>	<ul style="list-style-type: none"> • contracting out or outsourcing human resources and other functions or tasks • diversification of outcomes • finding cheaper or lower quality raw materials

RANGE STATEMENT	
	<p>and consumables</p> <ul style="list-style-type: none"> • increasing sales or production • recycling and re-using • rental, hire purchase or alternative means of procurement of required materials, equipment and stock • restructuring of organisation to reduce labour costs • risk identification, assessment and management processes • seeking further funding • strategies for reducing costs, wastage, stock or consumables • succession planning
<i>Organisation's policies, practices and procedures</i> may include:	<ul style="list-style-type: none"> • organisational culture • organisational guidelines which govern and prescribe operational functions, such as the acquisition and management of human and physical resources • Standard Operating Procedures • undocumented practices in line with organisational operations
<i>Designated persons/groups</i> may include:	<ul style="list-style-type: none"> • groups designated in workplace policies and procedures • managers or supervisors whose roles and responsibilities include decision making on operations • other stakeholders such as Board members • other work groups or teams whose work will be affected by recommendations for variations

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Management and Leadership - Management
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Co-requisite units

Co-requisite units	

BSBMGT516C Facilitate continuous improvement

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to lead and manage continuous improvement systems and processes. Particular emphasis is on the development of systems and the analysis of information to monitor and adjust performance strategies, and to manage opportunities for further improvements.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>This unit applies to managers who take an active role in managing a continuous improvement process in order to achieve an organisation's objectives. Where managers are closely associated with the creation and delivery of products and services, they play an important part in influencing the ongoing development of the organisation.</p> <p>At this level, work will normally be carried out using complex and diverse methods and procedures which require the exercise of considerable discretion and judgement, using a range of problem-solving and decision-making strategies.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Lead continuous improvement systems and processes	<p>1.1. Develop <i>strategies</i> to ensure that team members are actively encouraged and supported to participate in decision-making processes, assume responsibility and exercise initiative as appropriate</p> <p>1.2. Establish <i>systems</i> to ensure that the organisation's <i>continuous improvement processes</i> are communicated to <i>stakeholders</i></p> <p>1.3. Ensure that change and improvement processes meet <i>sustainability requirements</i></p> <p>1.4. Develop effective mentoring and coaching processes to ensure that individuals and teams are able to implement and support the organisation's continuous improvement processes</p> <p>1.5. Ensure that insights and experiences from business activities are captured and accessible through <i>knowledge management systems</i></p>
2. Monitor and adjust performance strategies	<p>2.1. Develop strategies to ensure that systems and processes are used to monitor <i>operational progress</i> and to identify ways in which planning and operations could be improved</p> <p>2.2. Adjust and communicate strategies to stakeholders according to organisational procedures</p>
3. Manage opportunities for further improvement	<p>3.1. Establish processes to ensure that team members are informed of outcomes of continuous improvement efforts</p> <p>3.2. Ensure processes include <i>recording of work team performance</i> to assist in identifying further opportunities for improvement</p> <p>3.3. Consider areas identified for further improvement when undertaking future planning</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication skills to communicate opportunities for improvement
- learning skills to coach and mentor staff, using a range of methods to cater for different learning styles
- innovation and lateral thinking skills to design better ways for achieving work outcomes
- planning skills to establish and monitor systems and process for continuous improvement
- teamwork and leadership skills to gain the confidence and trust of others

Required knowledge

- continuous improvement models
- knowledge management systems
- quality systems
- sustainability principles

Evidence Guide

EVIDENCE GUIDE	
The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> • development and use of a range of strategies and approaches that improve work outcomes or organisational functioning, using continuous improvement models • monitoring performance and customer service.
Context of and specific resources for assessment	Assessment must ensure access to appropriate documentation and resources normally used in the workplace.
Method of assessment	<p>The following assessment methods are appropriate for this unit:</p> <ul style="list-style-type: none"> • analysis of responses to case studies and scenarios • assessment of reports • direct questioning combined with review of portfolios of evidence and third-party workplace reports of on-the-job performance by the candidate • observation of presentations • oral or written questioning to assess knowledge of quality systems • review of strategies developed to ensure that team members are actively encouraged and supported to participate in decision-making processes, assume responsibility and exercise initiative • evaluation of how customer-service strategies were communicated to stakeholders • review of documentation outlining work team performance.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

<p><i>Strategies</i> may refer to:</p>	<ul style="list-style-type: none"> • clarification of roles and expectations • communication devices and processes, such as intranet and email communication systems, to facilitate input into workplace decisions • long-term or short-term plans that factor in opportunities for team input • mentoring and 'buddy' systems to support team members to participate in decision making • performance plans • reward and recognition programs for high performing staff • training and development activities.
<p><i>Systems</i> may refer to:</p>	<ul style="list-style-type: none"> • forums and meetings • newsletters and reports • policies and procedures • electronic communication devices.
<p><i>Continuous improvement processes</i> may include:</p>	<ul style="list-style-type: none"> • cyclical audits and reviews of workplace, team and individual performance • evaluations and monitoring of effectiveness • modifications and improvements to systems, processes, services and products • policies and procedures that allow an organisation to systematically review and improve the quality of its products, services and procedures • seeking and considering feedback from a range of stakeholders.
<p><i>Stakeholders</i> may include:</p>	<ul style="list-style-type: none"> • business or government contacts • funding bodies • individuals within the work team • internal and external contacts • organisation's clients and customers • professional associations • senior management and board members

RANGE STATEMENT	
	<ul style="list-style-type: none"> • unions and employee groups.
<p><i>Sustainability requirements</i> may include:</p>	<ul style="list-style-type: none"> • addressing environmental and resource sustainability initiatives, such as environmental management systems, action plans, green office programs, surveys and audits • applying the waste management hierarchy in the workplace • complying with regulations and corporate social responsibility considerations for sustainability to enhance the organisation's standing in business and community environments • determining organisation's most appropriate waste treatment, including waste to landfill, recycling, re-use, recoverable resources and wastewater treatment • implementing ecological footprinting • implementing environmental management systems, e.g. ISO 14001:1996 Environmental management systems life cycle analyses • implementing government initiatives, e.g. Australian government's Greenhouse Challenge Plus • improving resource and energy efficiency • initiating and maintaining appropriate organisational procedures for operational energy consumption • introducing a green office program (a cultural change program) • introducing green purchasing • introducing national and international reporting initiatives, e.g. Global Reporting Initiative • introducing product stewardship • reducing emissions of greenhouse gases • reducing use of non-renewable resources • referencing standards, guidelines and approaches, such as sustainability covenants and compacts or triple bottom line reporting • supporting sustainable supply chain.
<p><i>Knowledge management systems</i> may include:</p>	<ul style="list-style-type: none"> • best practice transfer • communities of practice • cross-project learning • expert directories • knowledge brokers' knowledge mapping • knowledge repositories • measuring and reporting intellectual capital • mentoring

RANGE STATEMENT	
	<ul style="list-style-type: none"> • performance management • post-project reviews • proximity and architecture • social software • storytelling.
<i>Operational progress</i> may refer to:	<ul style="list-style-type: none"> • customer service indicators • OHS indicators • productivity gains • success in meeting agreed goals and performance indicators.
<i>Recording of work team performance</i> may include:	<ul style="list-style-type: none"> • annotated performance plans • quantitative data, such as production figures • recommendations for improvement • records and reports.

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Management and leadership - management
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Co-requisite units

Co-requisite units		

BSBSUS501A Develop workplace policy and procedures for sustainability

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to develop and implement a workplace sustainability policy, including the modification of the policy to suit changed circumstances.</p> <p>This unit requires the ability to access industry information, applicable legislative and occupational health and safety (OHS) guidelines.</p> <p>While no licensing, legislative, regulatory or certification requirements apply holistically to this unit at the time of publication, relevant national, state and territory legislation, regulations and codes of practice impact upon this unit.</p>
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Application of the Unit

Application of the unit	<p>This unit addresses the knowledge, processes and techniques necessary to develop approaches to sustainability within workplaces, including the development and implementation of policy.</p> <p>This unit applies to people with managerial responsibility who undertake work developing approaches to create strategies within workplaces, including the development and implementation of policy and includes:</p> <ul style="list-style-type: none"> • communicating with relevant stakeholders • developing and monitoring policies • reviewing and improving policies. <p>A person who demonstrates competence in this unit must be able to provide evidence of the ability to develop and implement integrated sustainability policies and procedures within an enterprise. The review of the policy after implementation will also need to be evidenced.</p> <p>The context of the unit applies to all sectors of the business industry; it may be applied to all sections of an organisation, including the office, the factory floor, or work area. With such a broad application, the unit will need to be contextualised as it is applied across an organisation and across different industry sectors.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units	

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Develop workplace sustainability policy	1.1. Define <i>scope</i> of sustainability policy 1.2. Gather information from a range of <i>sources</i> to plan and develop policy 1.3. Identify and consult <i>stakeholders</i> as a key component of the policy development process 1.4. Include appropriate <i>strategies</i> in policy at all stages of work for minimising resource use, reducing toxic material and hazardous chemical use, and employing life cycle management approaches 1.5. Make recommendations for policy options based on likely effectiveness, timeframes and cost 1.6. Develop policy that reflects the organisation's commitment to sustainability as an integral part of business planning and as a business opportunity 1.7. Agree to appropriate methods of implementation
2. Communicate workplace sustainability policy	2.1. Promote workplace sustainability policy, including its expected outcome to key stakeholders 2.2. Inform those involved in implementing the policy as to outcomes expected, activities to be undertaken and responsibilities assigned
3. Implement workplace sustainability policy	3.1. Develop and communicate procedures to help implement workplace sustainability policy 3.2. Implement strategies for continuous improvement in resource efficiency 3.3. Establish and assign responsibility to use recording systems for tracking continuous improvements in sustainability approaches
4. Review workplace sustainability policy implementation	4.1. Document outcomes and provide feedback to key personnel and stakeholders 4.2. Investigate successes or otherwise of policy 4.3. Monitor records to identify trends that may require remedial action and use to promote continuous improvement of performance 4.4. Modify policy and or procedures as required to ensure improvements are made

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication skills to adjust communication to suit different audiences; to respond effectively to diversity; to work as a member of a team to consult on and validate policy
- literacy skills to read and evaluate complex and formal documents such as policy and legislation
- problem skills to effectively manage different points of view and dissenting stakeholders
- research, analytical and writing skills to research, analyse and present information; to prepare written reports requiring precision of expression and language and structures suited to the intended audience

Required knowledge

- best practice approaches relevant to own work area
- environmental or sustainability legislation, regulations and codes of practice applicable to industry and organisation
- equal employment opportunity, equity and diversity principles and occupational health and safety implications of policy being developed
- policy development processes and practices
- principles, practices and available tools and techniques of sustainability management relevant to the particular industry context
- quality assurance systems relevant to own organisation
- relevant industry competency
- relevant organisational policies, procedures and protocols
- relevant systems and procedures to aid in the achievement of workplace sustainability

Evidence Guide

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence of the following is essential:

- candidate's involvement as a key person in planning, developing and implementing organisational policy and that the developed policy complies with legislative requirements
- implementation strategy, as part of the policy, that has been devised, implemented and reviewed showing a measurable improvement utilising the chosen benchmark indicators
- communicating with stakeholders to discuss possible approaches to policy development and implementation, and contributing to the resolution of disputes among stakeholders
- developing and monitoring policies for analysing data on enterprise resource consumption
- using software systems for recording and filing documentation for measurement of current usage and using word processing and other basic software for interpreting charts, flowcharts, graphs and other visual data and information
- reviewing and improving policies by identifying improvements and benchmarking against industry best practice and attempting new approaches continuously over time.

Context of and specific resources for assessment

Assessment must ensure:

- access to an actual workplace or simulated environment
- access to relevant legislation/standards/guidelines
- access to a range of workplace documentation and personnel, information and resources (such as compliance obligations, organisational plans, work responsibilities)
- access to reports from other parties involved in the development and implementation of policy
- evidence is collected over time, involving both

EVIDENCE GUIDE	
	<p>formative and summative assessment</p> <ul style="list-style-type: none"> evidence is relevant to the particular workplace role, including work area, equipment, systems, and documentation.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> direct questioning combined with review of portfolios of evidence and third party workplace reports of on the job performance by the candidate response to case studies review of policy developed and procedural documentation outlining the approach taken review of implementation strategy, plans and work plans analysis of methods used to involve stakeholders in policy development, implementation and review analysis of inefficiencies or opportunities for improvements identified in the workplace evaluation of participation in sustainability work practices and programs such as an environmental management framework observation over time in relation to review of work area relating to policy and procedures being developed to assess measurement of resources used, hazards and compliance.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p> <ul style="list-style-type: none"> BSBATSIM419A Contribute to the development and implementation of organisational policies BSBHRM506A Manage recruitment, selection and induction processes BSBHRM602B Manage human resources strategic planning BSBINN502A Build and sustain an innovative work environment BSBMGT515A Manage operational plan BSBMGT516C Facilitate continuous improvement BSBMGT608C Manage innovation and continuous improvement BSBMGT616A Develop and implement strategic

EVIDENCE GUIDE	
	<p>plans</p> <ul style="list-style-type: none">• BSBMGT617A Develop and implement a business plan• BSBRSK501A Manage risk.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Scope of workplace sustainability policy may include:

- addressing sustainability initiatives through reference to standards, guidelines and approaches such as:
 - ecological foot printing
 - Energy Efficiency Opportunities Bill 20051
 - Global Reporting Initiative
 - green office program
 - green purchasing
 - Greenhouse Challenge Plus (Australian government initiative)
 - ISO 14001:1996 Environmental management systems life cycle analyses
 - life cycle analyses
 - product stewardship
 - supply chain management
 - sustainability covenants/compacts
 - triple bottom line reporting
- integrated approach to sustainability which includes environmental, economic and social aspects, or a specific approach that focuses on each aspect individually
- investigating particular business and market context of the industry/organisation
- meeting relevant laws, by laws and regulations or best practice to support compliance in environmental performance and sustainability at each level as required (such as Environmental Protection or Biodiversity Conservation Act):
 - international
 - commonwealth
 - state/territory
 - industry

RANGE STATEMENT	
	<ul style="list-style-type: none"> • organisation • parts of the organisation to which it is to apply, including whether it is for the whole organisation, one site, one work area or a combination of these.
<i>Sources</i> may include:	<ul style="list-style-type: none"> • regulatory sources • relevant personnel • organisational specifications.
<i>Stakeholders</i> may include:	<ul style="list-style-type: none"> • individuals and groups both inside and outside the organisation who have some direct interest in the organisation's conduct, actions, products and services, including: <ul style="list-style-type: none"> • customers • employees at all levels of the organisation • government • investors • local community • other organisations • regulators • suppliers • key personnel within the organisation and specialists outside the organisation who may have particular technical expertise.
<i>Strategies</i> may include:	<ul style="list-style-type: none"> • promotional activities • raising awareness among stakeholders • training staff in sustainability principles and techniques.

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Industry Capability - Sustainability
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Co-requisite units

Co-requisite units	

BSBWOR501B Manage personal work priorities and professional development

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to manage own performance and professional development. Particular emphasis is on setting and meeting priorities, analysing information and using a range of strategies to develop further competence.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>This unit applies to managers and focuses on the need for managers to be organised, focussed and skilled, in order to effectively manage the work of others. As such it is an important unit for most managers, particularly as managers serve as role models and have a significant influence on the work culture and patterns of behaviour.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Establish personal work goals	1.1. Serve as a positive role model in the workplace through personal work planning and organisation 1.2. Ensure personal work goals, plans and activities reflect the organisation's plans, and <i>own responsibilities and accountabilities</i> 1.3. Measure and maintain personal performance in varying work conditions, work contexts and contingencies
2. Set and meet own work priorities	2.1. Take initiative to prioritise and facilitate competing demands to achieve personal, team and organisational goals and objectives 2.2. Use <i>technology</i> efficiently and effectively to manage work priorities and commitments 2.3. Maintain appropriate work-life balance, and ensure stress is effectively managed and health is attended to
3. Develop and maintain professional competence	3.1. Assess personal knowledge and skills against <i>competency standards</i> to determine development needs, priorities and plans 3.2. Seek feedback from employees, <i>clients and colleagues</i> and use this feedback to identify and develop ways to improve competence 3.3. Identify, evaluate, select and use <i>development opportunities</i> suitable to personal learning style/s to develop competence 3.4. Undertake participation in networks to enhance personal knowledge, skills and work relationships 3.5. Identify and develop new skills to achieve and maintain a competitive edge

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication skills to receive, analyse and report on feedback
- literacy skills to interpret written and verbal information about workplace requirements
- organisational skills to set and achieve priorities.

Required knowledge

- principles and techniques involved in the management and organisation of:
 - performance measurement
 - personal behaviour, self-awareness and personality traits identification
 - personal development plan
 - personal goal setting
 - time management
- management development opportunities and options for self
- organisation's policies, plans and procedures
- types of learning style/s and how they relate to the individual
- types of work methods and practices that can improve personal performance.

Evidence Guide

EVIDENCE GUIDE	
<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> • systems and processes (electronic or paper-based) used to organise and prioritise tasks, which show how work is managed • personal development plan, with career objectives and an action plan
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> • access to appropriate documentation and resources normally used in the workplace.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> • analysis of responses to case studies and scenarios • direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate • observation of presentations • oral or written questioning to assess knowledge of work methods and practices that can improve personal performance • review of personal work goals, plans and activities • evaluation of work-life balance • review of documentation assessing personal knowledge and skills against competency standards.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p> <ul style="list-style-type: none"> • other units from the Diploma of Management.

Range Statement

RANGE STATEMENT	
<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
<p><i>Own responsibilities and accountabilities</i> may include:</p>	<ul style="list-style-type: none"> • expectations of workplace performance as expressed in a performance plan • outputs as expressed in position descriptions or duty statements • statement of conduct outlining an individual's responsibilities/actions/performance
<p><i>Technology</i> may include:</p>	<ul style="list-style-type: none"> • computerised systems and software, databases, project management and word processing • electronic diary • personal digital assistant (PDA)
<p><i>Competency standards</i> may include:</p>	<ul style="list-style-type: none"> • enterprise-specific units of competency consistent with work requirements • nationally endorsed units of competency consistent with work requirements
<p><i>Clients and colleagues</i> may be:</p>	<ul style="list-style-type: none"> • colleagues at the same level and more senior managers • internal or external customers • people from a wide range of social, cultural and ethnic backgrounds and with a range of physical and mental abilities • team members
<p><i>Development opportunities</i> may include:</p>	<ul style="list-style-type: none"> • action learning • coaching • exchange/rotation • induction • mentoring • shadowing • structured training programs

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Management and Leadership - Management
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Co-requisite units

Co-requisite units		

BSBWOR502B Ensure team effectiveness

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to facilitate all aspects of teamwork within the organisation. It involves taking a leadership role in the development of team plans, leading and facilitating teamwork and actively engaging with the management of the organisation.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement.</p>
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Application of the Unit

Application of the unit	<p>This unit applies to managers and addresses the need for managers to facilitate work teams and to build a positive culture within work teams. The unit takes a systematic and planned approach to developing teams. It includes the soft skills as well as more structured approaches to the management of teams.</p> <p>At this level, work will normally be carried out within complex and diverse methods and procedures which require the exercise of considerable discretion and judgement, using a range of problem solving and decision making strategies.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Establish team performance plan	1.1. Consult team members to establish a common understanding of team purpose, roles, responsibilities and accountabilities in accordance with organisational goals, plans and objectives 1.2. Develop performance plans to establish expected outcomes, outputs, key performance indicators and goals for work team 1.3. Support team members in meeting expected performance outcomes
2. Develop and facilitate team cohesion	2.1. Develop strategies to ensure team members have input into planning, decision making and operational aspects of work team 2.2. Develop policies and procedures to ensure team members take responsibility for own work and assist others to undertake required roles and responsibilities 2.3. Provide feedback to team members to encourage, value and reward individual and team efforts and contributions 2.4. Develop processes to ensure that issues, concerns and problems identified by team members are recognised and addressed
3. Facilitate teamwork	3.1. Encourage team members and individuals to participate in and to take responsibility for team activities, including communication processes 3.2. Support the team in identifying and resolving work performance problems 3.3. Ensure own contribution to work team serves as a role model for others and enhances the organisation's image for all stakeholders
4. Liaise with stakeholders	4.1. Establish and maintain open communication processes with all stakeholders 4.2. Communicate information from line manager/management to the team 4.3. Communicate unresolved issues, concerns and problems raised by team members and follow-up with line manager/management and other relevant stakeholders 4.4. Evaluate and take necessary corrective action regarding unresolved issues, concerns and problems raised by internal or external stakeholders

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication skills to explain team goals, to address team conflict and to build an environment of trust
- planning and organisational skills to keep team on track and focussed on work outcomes.

Required knowledge

- group behaviour
- strategies for mentoring and coaching to informally guide and instruct team members
- issue resolution
- strategies for gaining consensus.

Evidence Guide

EVIDENCE GUIDE	
The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the following is essential:</p> <ul style="list-style-type: none"> • range of techniques that can be used to build work teams, strengthen communications in the team and resolve issues • methods for engaging with stakeholders and obtaining advice from outside the work team, to ensure team is focussed and on track • knowledge of group behaviour.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> • access to appropriate documentation and resources normally used in the workplace.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> • analysis of responses to case studies and scenarios • assessment of written reports • demonstration of team building techniques • direct questioning combined with review of portfolios of evidence and third party workplace reports of on-the-job performance by the candidate • observation of performance in role plays • review of performance plans developed for work team • review of policies and procedures developed to ensure team members take responsibility for own work.
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p> <ul style="list-style-type: none"> • other units from the Diploma of Management.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

<p><i>Consultation</i> may refer to:</p>	<ul style="list-style-type: none"> • conducting meetings, interviews, brainstorming sessions, email/intranet communications, newsletters or other processes and devices which ensure that all employees have the opportunity to contribute to team and individual performance plans • mechanisms used to provide feedback to the work team in relation to outcomes of consultation
<p><i>Accountabilities</i> may refer to:</p>	<ul style="list-style-type: none"> • responsibilities as defined in position descriptions, codes of conduct/behaviour, duty statements or similar • statement of conduct outlining responsibilities/actions/performance
<p><i>Performance plans</i> may refer to:</p>	<ul style="list-style-type: none"> • individual performance plans linked to team goals • team plans based on work assignments and responsibilities
<p><i>Outcomes, outputs, key performance indicators</i> may refer to agreed:</p>	<ul style="list-style-type: none"> • changes in work roles and responsibilities • improved individual and team, performance and participation • improvements to systems, operations • measures for monitoring and evaluating the efficiency or effectiveness of systems or services • quality standards and expectations • targets for productivity improvements such as reduced downtime, higher production levels, decreases in absenteeism • targets for training and development
<p><i>Support</i> may include:</p>	<ul style="list-style-type: none"> • Coaching • Mentoring • Training and development opportunities • Clarification of roles and expectations

RANGE STATEMENT	
	<ul style="list-style-type: none"> • Long term or short term plans • Meetings
<i>Strategies</i> may refer to:	<ul style="list-style-type: none"> • clarification of roles and expectations • electronic communication devices and processes, such as intranet and email communication systems, to facilitate input • long-term or short-term plans factoring in opportunities for team input • mentoring and 'buddy' systems to support team members in providing input • newsletters and briefings • training and development activities
<i>Policies and procedures</i> may refer to:	<ul style="list-style-type: none"> • organisational guidelines and systems that govern operational functions • procedures that detail the activities that must be carried out for the completion of actions and tasks • Standard Operating Procedures
<i>Processes</i> may refer to:	<ul style="list-style-type: none"> • brainstorming options with the team for addressing concerns • creating a matrix of issues and concerns and distributing for comment • discussions with individuals regarding their concerns • distributing drafts for comment with a range of options for resolution of concerns • training and development sessions
<i>Stakeholders</i> may include:	<ul style="list-style-type: none"> • Board members • business or government contacts • funding bodies • union/employee groups and representatives • work team
<i>Line manager/management</i> may refer to:	<ul style="list-style-type: none"> • chief executive officer • direct superior • other management representatives

Unit Sector(s)

Unit sector	
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Competency field

Competency field	Industry Capability - Workplace Effectiveness
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Co-requisite units

Co-requisite units		

CPCCCM2007B Use explosive power tools

Modification History

Minor changes made to range statement, including addition of photovoltaic (solar) panels
Equivalent to CPCCCM2007A

Unit Descriptor

This unit of competency specifies the outcomes required to apply safe and effective operation of explosive power tools (EPT), used to fasten materials or fix fasteners to bases. It includes both direct action and indirect action explosive powered fastening tools.

Application of the Unit

This unit of competency supports achievement of skills to safely and effectively use a range of EPT used in the construction industry.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

CPCCOHS2001A Apply OHS requirements, policies and procedures in the construction industry

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

- | | | |
|---|--------------------|--|
| 1 | Plan and prepare. | 1.1 Work instructions, including plans, specifications, quality requirements and operational details, are obtained, confirmed and applied from relevant information for planning and preparation . |
| | | 1.2 Safety (OHS) requirements are followed in accordance with safety plans and policies. |
| | | 1.3 Signage and barricade requirements are identified and implemented. |
| | | 1.4 Plant, tools and equipment selected to carry out tasks are consistent with job requirements, checked for serviceability, and any faults are rectified or reported prior to commencement. |
| | | 1.5 Material quantity requirements are calculated in accordance with plans and specifications. |
| | | 1.6 Materials appropriate to work application are identified, obtained, prepared, safely handled and located ready for use. |
| | | 1.7 Environmental requirements are identified for the project in accordance with environmental plans and statutory and regulatory authority obligations, and are applied. |
| 2 | Set out fasteners. | 2.1 Minimum distances for set out from edge of substrate material are adhered to in accordance with legislation, regulations and codes of practice. |
| | | 2.2 Material is located and temporarily held or fixed into designed position according to detailed drawings. |
| 3 | Use EPT. | 3.1 EPT is checked for operation according to manufacturer specifications and safety (OHS) requirements for use of EPT . |
| | | 3.2 Fastener is selected according to requirements of job. |
| | | 3.3 Charge is selected to assessed requirements for material, base and penetration. |

- 3.4 **Attachments** and accessories are installed to EPT in accordance with manufacturer specifications and safety (OHS) requirements.
 - 3.5 **Fastener and charge** in EPT are located to manufacturer specifications.
 - 3.6 EPT operation is carried out and fastener is fixed into place in accordance with manufacturer recommendations, legislation, regulations and codes of practice.
 - 3.7 Fastening penetration is checked and appropriate depth into material is applied.
 - 3.8 Power regulating device is adjusted for conditions.
 - 3.9 Misfire procedures are carried out according to manufacturer recommendations, legislation, regulations and codes of practice.
 - 3.10 Temporary holding and fixings are removed without damage to material.
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- 4 Secure and store equipment and charges.
 - 4.1 Charges are stored in designated container in accordance with legislation, regulations and codes of practice and used charges are recorded.
 - 4.2 Unused fasteners, the EPT and attachments are stored in a carry case in line with manufacturer recommendations.
 - 4.3 Logbook is checked and maintenance recorded according to manufacturer recommendations.
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- 5 Maintain EPT and kit.
 - 5.1 Safety features of tools are checked for serviceability in accordance with manufacturer operating manual.
 - 5.2 Tools are cleaned and lubricated to manufacturer recommendations.
 - 5.3 Periodic maintenance service is carried out to manufacturer specifications.
 - 5.4 Diminished stocks of charges and fasteners are replenished to designed effectiveness of EPT kit.

- 6 Clean up.
 - 6.1 Work area is cleared and materials disposed of, reused or recycled in accordance with legislation, regulations, codes of practice and job specification.
 - 6.2 Plant, tools and equipment are cleaned, checked, maintained and stored in accordance with manufacturer recommendations and standard work practices.

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- communication skills to:
 - determine requirements
 - enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand
 - follow instructions
 - read and interpret:
 - documentation from a variety of sources
 - drawings and specifications
 - report faults
 - use language and concepts appropriate to cultural differences
 - use and interpret non-verbal communication, such as hand signals
 - written skills to record maintenance in logbook
- identifying and accurately reporting to appropriate personnel any faults in tools, equipment or materials
- numeracy skills to apply measurements and make calculations
- organisational skills, including the ability to plan and set out work
- teamwork skills to work with others to action tasks and relate to people from a range of cultural and ethnic backgrounds and with varying physical and mental abilities
- technological skills to:
 - use a range of mobile technology, such as two-way radio and mobile phones
 - voice and hand signals to access and understand site-specific instructions.

Required knowledge

Required knowledge for this unit is:

- construction terminology
- EPT materials
- EPT charges and fasteners
- equipment safety manuals and instructions
- job safety analysis (JSA) and safe work method statements
- material safety data sheets (MSDS)
- materials storage and environmentally friendly waste management

- plans, specifications and drawings
- processes for the calculation of material requirements
- quality requirements
- relevant Acts, regulations and codes of practice
- security and storage procedures for equipment and charges
- types, characteristics, uses and limitations of plant, tools and equipment
- workplace and equipment safety requirements.

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

This unit of competency could be assessed in the workplace or a close simulation of the workplace environment, provided that simulated or project-based assessment techniques fully replicate construction workplace conditions, materials, activities, responsibilities and procedures.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of the ability to:

- locate, interpret and apply relevant information, standards and specifications
- comply with site safety plan and OHS legislation, regulations and codes of practice applicable to workplace operations
- comply with organisational policies and procedures, including quality requirements
- safely and effectively use tools and equipment
- communicate and work effectively and safely with others
- fix metal or timber to a steel, concrete or masonry base on one project of each to job specifications, including:
 - completion of stripping and assembly of the tool
 - completing log of serviceability
 - maintaining and cleaning

- selecting charges and fasteners applicable to base material and material being fixed
- misfire procedures
- using attachments
- complying with storage and security regulations and OHS requirements for the working environment
- selecting signage
- test fire.

Context of and specific resources for assessment

This competency is to be assessed using standard and authorised work practices, safety requirements and environmental constraints.

Assessment of essential underpinning knowledge will usually be conducted in an off-site context.

Assessment is to comply with relevant regulatory or Australian standards' requirements.

Resource implications for assessment include:

- an induction procedure and requirement
- realistic tasks or simulated tasks covering the mandatory task requirements
- relevant specifications and work instructions
- tools and equipment appropriate to applying safe work practices
- support materials appropriate to activity
- workplace instructions relating to safe work practices and addressing hazards and emergencies
- material safety data sheets
- research resources, including industry related systems information.

Reasonable adjustments for people with disabilities must be made to assessment processes where required. This could include access to modified equipment and other physical resources, and the provision of appropriate assessment support.

Method of assessment

Assessment methods must:

- satisfy the endorsed Assessment Guidelines of the Construction, Plumbing and Services Training Package
- include direct observation of tasks in real or simulated work conditions, with questioning to

confirm the ability to consistently identify and correctly interpret the essential underpinning knowledge required for practical application

- reinforce the integration of employability skills with workplace tasks and job roles
- confirm that competency is verified and able to be transferred to other circumstances and environments.

Validity and sufficiency of evidence requires that:

- competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace
- where the assessment is part of a structured learning experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice, with a decision on competency only taken at the point when the assessor has complete confidence in the person's demonstrated ability and applied knowledge
- all assessment that is part of a structured learning experience must include a combination of direct, indirect and supplementary evidence.

Assessment processes and techniques should as far as is practical take into account the language, literacy and numeracy capacity of the candidate in relation to the competency being assessed.

Supplementary evidence of competency may be obtained from relevant authenticated documentation from third parties, such as existing supervisors, team leaders or specialist training staff.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Information includes:

- diagrams or sketches

- instructions issued by authorised organisational or external personnel
- manufacturer specifications and instructions where specified
- memos
- MSDS
- organisation work specifications and requirements
- plans and specifications
- regulatory and legislative requirements pertaining to using EPT
- relevant Australian standards
- safe work procedures related to using EPT
- signage
- verbal or written and graphical instructions
- work bulletins
- work schedules.

Planning and preparation include:

- work site inspection
- equipment defect identification
- assessment of conditions and hazards
- determination of work requirements.

Safety (OHS) is to be in accordance with legislation, regulations, codes of practice, organisational safety policies and procedures, and project safety plan and may include:

- emergency procedures, including extinguishing fires, organisational first aid requirements and evacuation
- handling of materials
- hazard control
- hazardous materials and substances
- safe operating procedures, including the conduct of operational risk assessment and treatments associated with:
 - earth leakage boxes
 - lighting
 - photovoltaic (solar) panels
 - power cables, including overhead service trays, cables and conduits
 - restricted access barriers
 - surrounding structures
 - traffic control
 - trip hazards
 - work site visitors and the public

- working at heights
- working in confined spaces
- working in proximity to others
- working with dangerous materials
- organisational first aid
- personal protective clothing and equipment prescribed under legislation, regulations and workplace policies and practices
- use of firefighting equipment
- use of tools and equipment
- workplace environment and safety.

Tools and equipment may include:

- direct action EPT
- indirect action EPT
- clamps and levels.

Materials include:

- timber
- metals
- patented fasteners.

Environmental requirements include:

- clean-up management
- noise and dust
- vibration
- waste management.

Statutory and regulatory authorities include:

- federal, state and local authorities administering applicable Acts, regulations and codes of practice.

Minimum distance for set out of fasteners is to be in accordance with:

- regulated minimum distances
- bases, including concrete, masonry or steel.

Use of EPT includes:

- stripping and assembling tools
- completing log of serviceability
- maintaining and cleaning tools
- selecting charges and fasteners applicable to the base material and material being fixed
- misfire procedures
- using attachments
- complying with storage and security regulations

and OHS requirements for the working environment

- selecting signage
- test fire.

Attachments include:

- channel, rebate and other manufacturer attachments.

Fastener and charge include:

- firing a test shot with misfire procedures, complying with the regulated safety procedure for misfire.

Unit Sector(s)

Functional area

Unit sector Construction

Custom Content Section

Not applicable.

CPCCLDG3001A Licence to perform dogging

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit specifies the outcomes required to perform slinging techniques, including the selection and inspection of lifting gear and/or the directing of the crane operator in the movement of the load when the load is out of view of the crane/ operator for licensing purposes.

Application of the Unit

Application of the unit This unit covers the scope of work to demonstrate competency in the application of slinging techniques, selection and inspection of lifting gear and/or the directing of the crane/ operator in the movement of the load.

This unit is based upon the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units Nil

Employability Skills Information

Employability skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan job.	<p>1.1. Site information is obtained and related to the task.</p> <p>1.2. Hazards and potential hazards associated with the slinging and directing of loads are identified.</p> <p>1.3. Hazard control measures consistent with appropriate standards are identified to ensure the safety of personnel and equipment.</p> <p>1.4. The weight, dimensions and centre of gravity of the load are identified and assessed.</p> <p>1.5. Suitable lifting/slinging points on the load are identified.</p> <p>1.6. Appropriate lifting equipment needs are assessed.</p> <p>1.7. Appropriate communication methods are assessed with crane/ operators and other appropriate personnel.</p> <p>1.8. Manufacturer's specifications/information is obtained for special loads where necessary.</p>
2. Select and inspect equipment.	<p>2.1. Lifting equipment appropriate to the task is selected.</p> <p>2.2. Lifting equipment is inspected for serviceability.</p> <p>2.3. Damaged or excessively worn lifting equipment is identified, labelled and rejected.</p> <p>2.4. Appropriate communication methods for the crane/operator and appropriate personnel are selected.</p> <p>2.5. Appropriate communication equipment is selected and its serviceability is checked.</p> <p>2.6. Appropriate personal protective equipment (PPE) is selected and checked.</p>
3. Prepare site and equipment.	<p>3.1. Hazard prevention/control measures are applied consistent with appropriate standards to ensure the safety of personnel and equipment.</p> <p>3.2. Appropriate slinging method is selected.</p> <p>3.3. Lifting equipment is prepared and assembled where appropriate.</p> <p>3.4. Load destination is prepared.</p>
4. Perform task.	<p>4.1. Lifting equipment is attached and secured to the lifting hook using appropriate techniques.</p> <p>4.2. Lifting hook is positioned over the load centre of gravity.</p> <p>4.3. Lifting equipment is attached and secured to the load</p>

ELEMENT**PERFORMANCE CRITERIA**

	in an appropriate manner.
	4.4. Tag line is attached and secured where appropriate.
	4.5. Test lift is conducted to ensure security of load.
	4.6. Load is moved maintaining stability and control at all times.
	4.7. Appropriate communication methods and <i>communication signals</i> are applied to safely coordinate the load movement both within sight and out-of-sight of crane operator.
	4.8. The load is landed to ensure that it is stable and secure from movement.
	4.9. Lifting equipment is removed or disconnected from load and prepared for next task or storage.
5. Shut down job and clean up.	5.1. Unserviceable lifting equipment inspected and rejected.
	5.2. <i>Defective equipment</i> is isolated and tagged.
	5.3. Lifting equipment is stored in accordance with procedures and appropriate standards.
	5.4. Hazard prevention/control measures are removed where appropriate.
	5.5. Excess materials from the work area are removed (where applicable).
	5.6. Defects are reported and recorded according to procedures and appropriate action is taken.

Required Skills and Knowledge**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- communication techniques in the workplace including whistles, hand signals and use of fixed channel two-way radios
- communication skills at a level sufficient to communicate with other site personnel
- calculate rated capacity of lifting equipment
- apply different methods for making temporary connections to loads using fibre and synthetic ropes

REQUIRED SKILLS AND KNOWLEDGE

- ability to interpret rated capacity and working load limit tags
- hazard identification and control
- slinging techniques
- selection and inspection of lifting equipment
- directing crane operators in the moving of loads in a safe manner, using a slewing crane
- inspection and care of a wide range of lifting equipment to appropriate Australian Standards and/or manufacturer's specifications.

Required knowledge

Required knowledge for this unit is:

- appropriate mathematical procedures for estimation and measurement of loads
- basic knowledge of types of cranes and their functions
- Commonwealth, state or territory OHS legislation, standards and codes of practice relevant to the full range of techniques for undertaking dogging activities
- load stability and safety factors in line with manufacturer's specifications
- types of lifting equipment and slinging techniques for use, and their limitations and performance in a wide range of conditions (including but not limited to slings, beams, accessories, clamps, work-boxes, bins and pallets)
- understanding of the hierarchy of control.

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Successful assessment of this unit meets the competency requirement of the National Standard for licensing Persons Performing High Risk Work.

State/Territory OHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment of this unit which have been endorsed by the national body responsible for OHS matters.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of the ability to:

- comply with Commonwealth, state or territory OHS legislation, standards relevant to safe dogging and crane operations.
- communicate and work safely with others in the work area.
- apply Hazard prevention and control measures consistent with appropriate standards.
- apply to move loads in conjunction with cranes including, the reading of tags, slinging, loading, directing and landing loads with a slewing mobile crane with a telescopic boom and a winch, in and out of sight of the crane/operator, moving four loads of varying shapes, sizes and weights.
- use fibre and/or synthetic rope as tag lines, and connecting to loads using clove hitch, rolling hitch, bowline and single sheetbend.
- conduct pre and post operational checks of the lifting equipment.
- Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the national OHS endorsed Assessment Instrument
- Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting

Context of and specific resources for assessment

EVIDENCE GUIDE

- Assessors must ensure that the assessment in the workplace is organised through a workplace supervisor to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace
- Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints
- Assessment is to comply with the requirements of any relevant Standards or operating procedures for dogging activities
- Applicants must have access to:
 - personal protective equipment (PPE) for the purpose of the performance assessment.
 - four different loads as prescribed in the endorsed assessment instrument
 - lifting and associated equipment
 - suitable slewing crane
 - communication equipment (eg. fixed channel, two-way radios) as applicable.

Method of assessment

Assessment must be conducted using the national OHS endorsed Assessment Instrument. This Instrument provides instruction on the application of the assessment.

Assessment may be in conjunction with the assessment of other units of competency.

The use of '**simulators**' in the assessment of this unit of competency is **not acceptable**.

Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge.

Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.

Guidance information for assessment

Further information about endorsed Assessment Instruments may be obtained from state/territory OHS regulators.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Site information may include but not be limited to

- local conditions such as access and egress
- work method statements.

Hazards may include but not limited to:

- ground stability (eg. ground condition, recently filled trenches, slopes)
- overhead hazards (e.g. power lines, service pipes, trees, buildings, etc)
- insufficient lighting
- traffic (e.g. pedestrians, vehicles, plant)
- weather (e.g. wind, lightning, storms)
- other specific hazards (e.g. trip hazards, heights, radio interference, etc).

Hazard prevention/control measures

The systematic process of eliminating or reducing the risk to personnel and property through the application of controls.

It includes the application of the hierarchy of controls, including:

1. elimination.
2. substitution.
3. isolation.
4. engineered control measures.
5. safe work practices.
6. personal protective equipment.

Appropriate standard s may include:

- codes of practice
- legislation
- Australian Standards
- manufacturer's specifications
- industry standards.

Lifting Equipment may include but not limited to:

- fibre ropes
- wire ropes
- chain

RANGE STATEMENT

- wire and synthetic slings
 - shackles
 - eyebolts
 - beam clamps
 - plate clamps
 - spreader beams
 - lifting beams
 - pallet forks and cages
 - concrete kibbles
 - personnel boxes.
- Communication Methods* may include but are not limited to:
- written instructions
 - signage,
 - hand signals
 - listening
 - questioning to confirm understanding
 - appropriate worksite protocol.
- Cranes* may include but not limited to:
- tower cranes (including self erecting)
 - portal boom cranes
 - vehicle loading cranes
 - slewing mobile cranes
 - non-slewing cranes
 - derrick cranes.
- Appropriate personnel* may include but are not limited to:
- supervisors
 - colleagues
 - managers who are authorised to take responsibility for the workplace or operations.
- Communication Equipment* may include but not limited to:
- fixed channel two-way radios
 - whistles
 - bells.
- Personal protective equipment* (PPE) may include but not limited to:
- hard hat
 - safety boots
 - gloves
 - high visibility clothing
 - reflective vest
 - relevant breathing, hearing, sight, skin and sun protection.
- Load destination* may include but not limited to:
- ground
 - loading platforms
 - suspended floors
 - vehicles.

RANGE STATEMENT

Communication signals may include but not limited to:

- stop - hand
- stop - whistle
- hoist up - hand
- hoist up - whistle
- hoist down - hand
- hoist down - whistle
- luff boom down - hand
- luff boom down - whistle
- luff boom up - hand
- luff boom up - whistle
- telescope out - hand
- telescope out - whistle
- telescope in - hand
- telescope in - whistle
- slew left - hand
- slew left - whistle
- slew right - hand
- slew right - whistle.

Defective Equipment may include but not limited to:

- excessive wear
- damage
- stretched
- broken wires
- cut/damaged fibres.

Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

Functional area

Functional area

CPCCLHS3001A Licence to operate a personnel and materials hoist

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit specifies the outcomes required to operate a builder's hoist in which personnel, goods and/or materials may be hoisted, and which comprises a car, structure, machinery or other equipment associated with the hoist, and which may be a cantilever hoist, a tower hoist or a multiple winch operation. Included in this definition are situations where winches may be configured to operate as hoists for the transportation of personnel for licensing purposes.

Application of the Unit

Application of the unit This unit requires the operator to plan work, conduct routine checks, conduct hoist operations and shut down and secure a hoist.

This unit is based on the requirements of the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit, which is not acceptable to regulators for the purpose of licensing.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units Nil

Employability Skills Information

Employability skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan work.	1.1. Potential workplace <i>hazards</i> are identified. 1.2. <i>Hazard prevention/control measures</i> are identified consistent with <i>appropriate standards</i> to ensure the safety of personnel and equipment. 1.3. The <i>hoist</i> is appropriate to the load/s and workplace conditions. 1.4. The weight of the load is determined according to <i>procedures</i> . 1.5. Appropriate communication methods are identified with appropriate personnel.
2. Conduct routine checks.	2.1. Hoist is visually checked for any damage or defects. 2.2. Appropriate hazard prevention/control measures are applied to the work area according to procedures and potential hazards. 2.3. <i>Service logbook</i> for the hoist is checked for compliance. 2.4. <i>Routine pre-start operational checks</i> are carried out according to procedures. 2.5. Main power supply is switched on. 2.6. Hoist is started according to procedures and checks made for any abnormal noises. 2.7. All controls located and checked for serviceability. 2.8. Post start operational checks are carried out according to procedures. 2.9. All <i>communication equipment</i> , lighting and alarm systems are checked for serviceability. 2.10. All hoist <i>safety devices</i> are tested to their maximum according to procedures. 2.11. All damage and defects are reported and recorded according to procedures and appropriate action taken.
3. Conduct hoist operations.	3.1. Hoist is operated according to procedures. 3.2. Communication methods associated with hoist movements are conducted according to procedures and the appropriate standards. 3.3. Loads and load distribution are continually monitored to ensure that the hoist is operated within its capacity according to procedures. 3.4. Hoist movement is monitored constantly ensuring safety to appropriate personnel and hoist stability.

ELEMENT	PERFORMANCE CRITERIA
4. Shut down and secure hoist.	<p>3.5. <i>Unplanned and/or unsafe situations</i> are responded to in line with procedures.</p> <p>4.1. Hoist is <i>shut down</i> according to procedures.</p> <p>4.2. All fences and gates are secured according to procedures.</p> <p>4.3. Routine post -operational checks are carried out according to procedures.</p> <p>4.4. Power is isolated and secured against unauthorised access.</p> <p>4.5. All damage and defects are reported and recorded according to procedures and appropriate action taken.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- accurately record and maintain information relating to personnel and materials hoist operations
- communication techniques in the workplace including bells, lights, intercom and use of two-way radios
- conduct personnel and materials hoist operations
- operate emergency brake and decent system
- hazards associated with the operation of the personnel and materials hoist are identified, risks are assessed and effective hazard prevention/control measures for those hazards identified and put into place
- inspect personnel and materials hoist equipment, safety equipment and installation for safe operation including general maintenance
- communication skills at a level sufficient to communicate with other site personnel (e.g. receive and interpret work instructions, safety information, emergency procedures)
- verify problems and equipment faults and demonstrate appropriate response.

Required knowledge

Required knowledge for this unit is:

REQUIRED SKILLS AND KNOWLEDGE

- weight of the load is determined from labels, markings or load paperwork
- level of literacy to be able to read and comprehend manufacturer's instructions, procedures and safety signs
- Commonwealth, state or territory OHS legislation, standards and codes of practice relevant to the full range of processes for the hoist class
- hoist operations and operating techniques
- understanding of the hierarchy of hazard identification and control
- materials safety data sheets and requirements for safe movement of materials
- organisational and workplace standards, requirements, policies and procedures for conducting operations for the hoist class
- procedures for the recording, reporting and maintenance of workplace records and information
- rated capacity and working load limits
- typical routine problems encountered in the operation of a personnel and materials hoist, inspection techniques and adjustments required for correction.

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Successful assessment of this unit meets the competency requirement of the National Standard for licensing Persons Performing High Risk Work.

State/territory OHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for OHS matters.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of the ability to:

- comply with OHS licensing legislation
- effectively communicate and work safely with others in the work area
- identify hazards associated with the operation of the hoist and put in place effective hazard controls for those hazards identified
- determine load weights
- effectively conduct personnel and materials hoist operations to include the tasks of raising and lowering loads with hoist; in conjunction with awareness of the limitations of the hoist according to manufacturer's specifications
- ensure hoist controls are attended throughout operation.
- effectively conduct emergency lowering of the hoist according to the emergency lowering procedure
- effectively conduct pre operational and shut down checks of the personnel and materials hoist (particular awareness of controls, alarms and lockout devices).
- Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the endorsed Assessment Instrument
- Assessment of performance must be

Context of and specific resources for assessment

EVIDENCE GUIDE

undertaken either in the workplace or in a realistically simulated workplace

- Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace
- Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints
- Assessment is to comply with relevant appropriate standard requirements
- Applicants must have access to:
 - personal protective equipment (PPE) for the purpose of the Performance Assessment.
 - appropriate personnel and material hoist and associated equipment in safe condition
 - suitable loads as specified by the endorsed assessment instrument
 - communication equipment (e.g. two-way radios, intercoms, light systems, buzzers, bells etc)

Method of assessment

Assessment must be conducted using the endorsed Assessment Instruments. These Instruments provide advice on their application.

The use of '**simulators**' in the assessment of this unit of competency is **not acceptable**.

Assessment may be in conjunction with the assessment of other units of competency.

Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge.

Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.

Guidance information for assessment

Further information about endorsed Assessment Instruments may be obtained from state/territory OHS regulators.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Hazards may include but are not limited to:

- ground conditions (e.g. condition of pavement, slopes)
- overhead hazards (e.g. power lines, service pipes)
- traffic (e.g. pedestrians, vehicles, other plant)
- environmental conditions (e.g. wind, lightning, rain)
- hoist overload
- other specific hazards (e.g. dangerous materials).

Hazard prevention/control measures may include:

Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls. It includes application of the hierarchy of control, the six step preference of control measures to manage and control risk:

- elimination
- substitution
- isolation
- engineering control measures
- using safe work practices
- personal protective equipment
- codes of practice
- legislation
- Australian standards
- manufacturer specifications.

Appropriate standards may include:

- the operation of a builder's hoist in which personnel, goods and/or materials may be hoisted, and which comprises a car, structure, machinery or other equipment associated with the hoist, and which may be a cantilever hoist, a tower hoist or a multiple winch operation. Included in this definition are situations where winches may be configured to operate as

RANGE STATEMENT

<i>Procedures</i> may include but not limited to:	<p>hoists for the transportation of personnel.</p> <ul style="list-style-type: none"> • manufacturer's guidelines (instructions, specifications or checklists) • industry operating procedures • workplace procedures (work instructions, operating procedures, checklists).
<i>Communication methods</i> may include but not limited to:	<ul style="list-style-type: none"> • verbal and non-verbal language • written instructions • signage • hand signals • listening • questioning to confirm understanding • appropriate worksite protocol • interfloor/level communications
<i>Appropriate personnel</i> may include but not limited to:	<ul style="list-style-type: none"> • those associated with the operations of the personnel and materials hoist • supervisors • colleagues • managers who are authorised to take responsibility for the workplace or operations.
<i>Service logbook</i> may include but is not limited to:	<ul style="list-style-type: none"> • any logbook • service book • history record system where the service and maintenance history is kept.
<i>Routine pre start operational checks</i> may include but not limited to:	<ul style="list-style-type: none"> • ground stability • tower ties/guys are secure • power supply is covered by earth leakage protection • power leads secured above ground level and not attached to scaffolds or building structure • tower guides are clean and free of rust and damage • signs are clearly displayed and legible • brakes and drive mechanism • overhead protection • intercom and signalling systems • barriers, fencing and gates • fuels, oil and water • lubrication (grease) • hoist rope • sheaves and anchorage points.

RANGE STATEMENT

Communication equipment may include but not limited to:

- fix frequency two-way radios
- bells
- buzzers
- lights.

NB: where radio communication equipment is used the transmitting frequencies of the equipment must be selected to prevent interference to or from other radio equipment being used in the vicinity of the hoist.

Safety devices may include but not limited to:

- emergency braking system
- overrun limits
- gate interlocks
- personnel access interlock on hoist roof.

Appropriate standards may include but are not limited to:

- codes of practice
- legislation
- Australian Standards
- manufacturer's specifications
- industry standards (where applicable).

Unplanned and/or unsafe situations may include but not limited to:

- failure/loss of control e.g. power supply, braking system
- failure of equipment e.g. hydraulic system, broken hoist cable, damaged gear drive
- environmental conditions e.g. wind, lightning, storms.

Shut down may include but not limited to:

- platform positioned at base of tower
- lock on manual safety brake
- landing gates secured to prevent unauthorised access
- power isolated from control panel
- mains power supply isolated and secured
- internal combustion engine idled to stabilise temperature
- engine turned off
- fencing/barriers around base secured to prevent unauthorised access
- key removed (where applicable).

Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

Functional area

Functional area

CPCCLHS3002A Licence to operate a materials hoist

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit specifies the outcomes required to operate a materials hoist being a builder's hoist by which only goods or materials and not personnel may be hoisted and where the car, bucket or platform is cantilevered from, and travels up and down externally to, a face of the support structure for licensing purposes.

Application of the Unit

Application of the unit This unit requires the operator to plan work, conduct routine checks, check controls and operation, conduct hoist operation and shut down and secure hoist.

This unit is based on the requirements of the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units Nil

Prerequisite units Nil

Employability Skills Information

Employability skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan work.	1.1. Potential workplace <i>hazards</i> are identified. 1.2. <i>Hazard control measures</i> are identified consistent with <i>appropriate standards</i> to ensure the safety of personnel and equipment. 1.3. The <i>hoist</i> is appropriate to the load/s and workplace conditions. 1.4. The weight of the load is determined according to <i>procedures</i> . 1.5. Appropriate communication methods are identified with appropriate personnel.
2. Conduct routine checks.	2.1. Hoist is visually checked for any damage or defects 2.2. Appropriate <i>hazard prevention/control measures</i> are applied to the work area according to <i>procedures</i> . 2.3. <i>Service logbook</i> for the hoist is checked for compliance 2.4. <i>Routine pre-start operational checks</i> are carried out according to procedures. 2.5. Main power supply is switched on. 2.6. Hoist is started according to procedures and checked for any abnormal noises. 2.7. All controls located and checked for serviceability. 2.8. Post start operational checks are carried out according to procedures. 2.9. All <i>communication equipment</i> , lighting and alarm systems are checked for serviceability. 2.10. All hoist <i>safety devices</i> and functions are tested to their maximum according to procedures. 2.11. All damage and defects are reported and recorded according to procedures and appropriate action taken.
3. Conduct hoist operations.	3.1. Hoist is operated according to procedures. 3.2. Communication methods associated with hoist movement are conducted according to procedures and the appropriate standard. 3.3. Loads and Load distribution are continually monitored to ensure that the hoist is operated within its capacity and according to procedures. 3.4. Hoist movement is monitored constantly ensuring safety to personnel and stability. 3.5. <i>Unplanned and/or unsafe</i> situations are responded

ELEMENT	PERFORMANCE CRITERIA
4. Shut down and secure hoist.	<p>to in line with procedures.</p> <p>4.1. Hoist is shut down, according to procedures.</p> <p>4.2. All fences and gates are secured according to procedures.</p> <p>4.3. Routine post -operational checks are carried out according to procedures.</p> <p>4.4. Power is isolated and secured against unauthorised access.</p> <p>4.5. All damage and defects are reported and recorded according to procedures and appropriate action taken.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- accurately record and maintain information relating to materials hoist operations
- communication techniques in the workplace including bells, lights, hand signals intercom and use of two-way radios
- conduct materials hoist operations
- hazards associated with the operation of the materials hoist are identified, risks are assessed and effective hazard prevention/control measures for those hazards identified and put into place
- inspect materials hoist equipment, safety equipment and installation for safe operation
- interpersonal communication skills at a level sufficient to communicate with other site personnel (e.g. receive and interpret work instructions, safety information, emergency procedures)
- verify problems and equipment faults and demonstrate appropriate response procedures.

Required knowledge

Required knowledge for this unit is:

- weight of the load is determined from labels, markings or load paperwork
- level of literacy to be able to read and comprehend manufacturer's instructions,

REQUIRED SKILLS AND KNOWLEDGE

procedures and safety signs

- Commonwealth, state or territory OHS legislation, standards and codes of practice relevant to the full range of processes for the hoist class
- hoist operations and operating techniques
- understanding of the hierarchy of hazard identification and control
- materials safety data sheets and requirements for safe movement of materials
- organisational and workplace standards, requirements, policies and procedures for conducting operations for the hoist class
- procedures for the recording, reporting and maintenance of workplace records and information
- rated capacity and working load limits
- typical routine problems encountered in the operation of a materials hoist, inspection techniques and adjustments required for correction.

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Successful assessment of this unit meets the competency requirement of the National Standard for licensing Persons Performing High Risk Work.

State/Territory OHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for OHS matters.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of the ability to:

- comply with OHS licensing legislation.
- effectively communicate and work safely with others in the work area.
- identify hazards associated with the operation of the hoist and put in place effective hazard prevention/controls
- determine load weights.
- effectively conduct materials hoist operations to include the tasks of raising and lowering loads with equipment and materials for cantilevered cars, buckets or platforms.
- ensure the hoist is attended at all times.
- effectively conduct pre operational and shut down checks of the materials hoist (particular awareness of controls, alarms and lockout devices).

Context of and specific resources for assessment

- Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the endorsed Assessment Instrument
- Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting
- Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a

EVIDENCE GUIDE

suitable working area is made available to suit the assessment and the workplace

- Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints
- Assessment is to comply with relevant appropriate standard requirements
- Applicants must have access to:
 - personal protective equipment (PPE) for the purpose of the Performance Assessment.
 - appropriate material hoist and equipment in safe condition
 - suitable loads as specified by the endorsed assessment instrument
 - communication equipment (e.g. two-way radios, intercoms, light systems buzzers or bells etc)

Method of assessment

Assessment must be conducted using the endorsed Assessment Instruments. These Instruments provide advice on their application.

The use of **'simulators'** in the assessment of this unit of competency is **not acceptable**.

Assessment may be in conjunction with the assessment of other units of competency.

Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge.

Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.

Guidance information for assessment

Further information about endorsed Assessment Instruments may be obtained from state/territory OHS regulators.

Range Statement

RANGE STATEMENT

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Hazards may include but not limited to:

- ground conditions (e.g. condition of pavement, slopes)
- overhead hazards (e.g. power lines, service pipes)
- Insufficient lighting
- traffic (e.g. pedestrians, vehicles, other plant)
- environmental conditions (e.g. wind, lightning, rain)
- hoist overload
- other specific hazards (e.g. dangerous materials).

Hazard control measures:

Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls.

It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk:

- elimination
- substitution
- isolation
- engineering control measures
- using safe work practices
- personal protective equipment.
- codes of practice
- legislation
- Australian Standards
- manufacturer's specifications
- industry standard (where applicable).

Appropriate standards may include but not limited to:

- codes of practice
- legislation
- Australian Standards
- manufacturer's specifications
- industry standard (where applicable).

Hoist may include:

the operation of builder's hoist by which only goods or materials and not personnel may be hoisted and where the car, bucket or platform is cantilevered from, and travels up and down externally to, a face of the support structure.

Procedures may include but are

- manufacturer's guidelines (instructions,

RANGE STATEMENT

not limited to:

specifications or checklists)

- industry operating procedures
- workplace procedures (work instructions, operating procedures, checklists).

Communication methods may include but are not limited to:

- verbal and non-verbal language
- written instructions
- signage
- hand signals
- listening
- questioning to confirm understanding
- appropriate worksite protocol
- interfloor/ level communications.

Appropriate personnel may include but are not limited to:

- those associated with the operations of the hoist
- supervisors
- colleagues
- managers who are authorised to take responsibility for the workplace or operations.

Hazard prevention/control measures may include but not limited to:

- safety tags on electrical switches/isolators
- traffic barricades and control
- pedestrian barricades
- movement of obstructions
- personal protective equipment
- hoist safety gates and guards
- hoist safety interlocks
- adequate illumination.

Service logbook may include but is not limited to:

- any logbook
- service book
- history record system where the service and maintenance history is kept.

Routine pre start operational checks may include but are not limited to:

- check ground stability
- tower ties/guys are secure
- power supply is covered by earth leakage protection
- power leads are secured above ground level and not attached to scaffolds or building structure
- tower guides are clean and free of rust and damage
- signage is clearly displayed and legible
- brakes and drive mechanism

RANGE STATEMENT

Communication equipment may include but is not limited to:

- overhead protection
- intercom and signalling systems
- barriers, fencing and gates
- fuels, oil and water (where applicable)
- lubrication (grease)
- hoist rope
- sheaves and anchorage points.
- fixed channel two-way radios
- intercoms
- bells
- lights
- buzzers.

NB: where radio communication equipment is used the transmitting frequencies of the equipment must be selected to prevent interference to or from other radio equipment being used in the vicinity of the hoist.

Safety devices may include but not limited to:

- emergency braking system
- overrun limits
- gate interlocks.

Unplanned and/or unsafe situations may include but are not limited to:

- failure/lose of control e.g. power supply, braking system
- failure of equipment e.g. hydraulic system, broken hoist cable, damaged drive gear
- environmental conditions (e.g. wind, lightning, storms, etc).

Shut Down may include but not limited to:

- position platform at base of tower
- power isolated from control panel
- mains power supply isolated and secured
- fencing/barriers around base secured to prevent unauthorised access
- landing gates secured to prevent unauthorised access
- key removed from control panel (where applicable).

Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

Functional area

Functional area

CPCCLRG3001A Licence to perform rigging basic level

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit specifies the outcomes required to perform basic rigging work associated with movement of plant and equipment, steel erections, hoists (including mast climbing hoists), placement of pre-cast concrete, safety nets and static lines, perimeter safety screens and shutters; and cantilever crane loading platforms for licensing purposes.

Application of the Unit

Application of the unit This unit requires the applicant to be able plan the work, select and inspect equipment, set up task, erect structures and plant and dismantle structures and plant.

This unit is based upon the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

This unit has a pre-requisite requirement. This requirement may be met by either the successful completion of the unit *CPCCLDG3001A Licence to perform dogging* or holding a valid licence for dogging.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units

CPCCLDG3001A Licence to perform dogging

Employability Skills Information

Employability skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan job.	<p>1.1. Task to be undertaken is assessed.</p> <p>1.2. Potential workplace <i>hazards</i> are identified.</p> <p>1.3. <i>Hazard control measures</i> are identified consistent with <i>appropriate standards</i> to ensure the safety of personnel and equipment.</p> <p>1.4. Site information is obtained.</p> <p>1.5. All <i>forces and loads</i> associated with erecting and dismantling <i>structures</i> and <i>associated plant</i> are considered in consultation with <i>appropriate personnel</i>.</p> <p>1.6. <i>Rigging equipment</i> and <i>associated equipment</i> are identified in consultation with appropriate personnel according to <i>procedures</i> and site information.</p> <p>1.7. <i>Safety equipment</i> is identified.</p> <p>1.8. Appropriate <i>communication methods</i> are identified with appropriate personnel.</p>
2. Select and inspect equipment.	<p>2.1. Rigging equipment and associated equipment are selected and inspected according to procedures and the appropriate standard.</p> <p>2.2. Safety equipment is selected and inspected according to procedures.</p> <p>2.3. All defective rigging equipment, associated equipment and safety equipment is isolated, reported and recorded according to procedures.</p> <p>2.4. <i>Communication equipment</i> is selected and inspected for serviceability (where applicable).</p>
3. Set up task.	<p>3.1. Appropriate <i>hazard prevention/control measures</i> are applied to the work area according to procedures.</p> <p>3.2. <i>Ground suitability</i> is inspected and checked (where appropriate).</p> <p>3.3. Site information is reviewed, interpreted and communicated to appropriate personnel and <i>appropriate personnel</i>.</p> <p>3.4. All forces and loads associated with erecting and dismantling structures and associated plant are determined in consultation with appropriate personnel.</p> <p>3.5. Safety equipment is fitted and worn correctly (where appropriate).</p> <p>3.6. Rigging equipment and associated plant are</p>

ELEMENT	PERFORMANCE CRITERIA
4. Erect structures and plant.	<p>positioned for work application and stability according to procedures.</p> <p>3.7. Methods of applying <i>temporary connections</i> using fibre rope are applied according to procedures and the appropriate standard.</p> <p>4.1. Structures and associated plant are erected according to procedures and site information.</p> <p>4.2. Stability of structures and associated plant is maintained during erection according to procedures.</p> <p>4.3. Work is conducted safely at heights including safe and effective use of safety equipment.</p> <p>4.4. Appropriate communication methods and communication equipment, are used to co-ordinate the tasks.</p> <p>4.5. Associated plant and rigging equipment is used according to procedures and the appropriate standard.</p> <p>4.6. Temporary guys, ties, propping and shoring, including <i>flexible steel wire rope</i>, and tubing, are connected where required.</p> <p>4.7. Associated equipment is used in a safe and appropriate manner.</p> <p>4.8. The completed task is inspected according to the appropriate standard.</p> <p>4.9. Excess materials are removed from the work area (where applicable).</p>
5. Dismantle structures and plant.	<p>5.1. Structures and associated plant are dismantled according to procedures and the appropriate standard.</p> <p>5.2. Work is conducted safely at heights including safe and effective use of safety equipment.</p> <p>5.3. Stability of structures and associated plant is maintained during dismantling according to procedures.</p> <p>5.4. Rigging equipment, associated equipment, safety equipment and associated plant are inspected for damage and defects.</p> <p>5.5. All defective rigging equipment, associated equipment, associated plant and safety equipment are isolated reported and recorded according to procedures.</p> <p>5.6. Rigging equipment and associated equipment are</p>

ELEMENT	PERFORMANCE CRITERIA
	stored. according to procedures and the appropriate standard.
	5.7. Hazard prevention/control measures are removed (where appropriate).

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- ability to calculate Safe Working Load (SWL) and Working Load Limit (WLL)
- ability to erect and dismantle, level, plumb and stabilise associated plant and structures
- ability to work safely at heights including the correct application of safety equipment.
- accurate interpretation of basic structural charts and structural plans (site information)
- applying methods for making temporary connections of ropes using fibre and synthetic types
- apply methods of splicing and whipping fibre and synthetic ropes
- correct application and use of all rigging and associated equipment
- risk assessment and hazard control strategies
- interpersonal and communication skills at a level sufficient to site/workplace requirements. This includes the relevant communication methods and equipment.
- verify problems and equipment faults and demonstrate appropriate response.

Required knowledge

Required knowledge for this unit is:

- appropriate mathematical procedures for estimation and measurement of loads
- ability to interpret manufacturer's specifications for all plant and equipment use in rigging operations
- knowledge of principles relating to all plant, equipment and structural stability
- knowledge of the types and functions of rigging, safety and associated equipment including an understanding of their limitations.
- organisational and workplace standards, requirements, policies and procedures for rigging

REQUIRED SKILLS AND KNOWLEDGE

- understanding of the hierarchy of hazard identification and control
- relevant Commonwealth, state or territory and local government OHS legislation, standards and codes of practice for undertaking rigging activities
- understanding of inspection and maintenance requirements of a wide range of appropriate plant and equipment in line with Australian Standards or manufacturer's specifications
- estimation of ground bearing pressures of the full range of soil types and associated ground conditions for setting up plant and equipment.

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Successful assessment of this unit meets the competency requirement of the National Standard for licensing Persons Performing High Risk Work.

State/Territory OHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment endorsed by the national body responsible for OHS matters for the assessment of this unit.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of the ability to:

- comply with OHS licensing legislation.
- effectively communicate and work safely with others in the work area.
- effectively conduct risk assessment and management procedures.
- effectively complete the following tasks:-
 - inspection of all plant and equipment, and
 - installation of a fall arrest system (Static line), and
 - use of a safety harness / fall arrest system, and
 - installation of crane loading platforms and
 - installation of a safety net, and
 - installation of a shutter and safety screen, and
 - demonstrated ability to work safely at heights, and
 - erection of structural steel, and
 - erection of precast panel, and
 - set up and operation of a winch for load movement, and
 - installation of a materials hoist, or
 - installation of a mast climber.
- effectively demonstrate the following knots,

EVIDENCE GUIDE

bends and hitches:-

- Sheet bend,
- Becket hitch,
- Running bowline,
- Double bowline.
- effectively demonstrate the following splices and whippings:-
 - Eye splice,
 - Back splice,
 - Short splice,
 - Sail makers whipping,
 - Common whipping,
 - West countryman's

Context of and specific resources for assessment

Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the National OHS endorsed Assessment Instrument.

Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting.

Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace.

Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints.

Assessment is to comply with the requirements of any relevant Standards or operating procedures for basic rigging.

Applicants must have access to:

- personal protective equipment (PPE) for the purpose of the Performance Assessment.
- appropriate safety equipment in safe condition
- appropriate rigging equipment, associated equipment associated plant in safe condition as described in the endorsed assessment instrument
- communication equipment (e.g. two-way

EVIDENCE GUIDE

<p>Method of assessment</p>	<p>radios) where applicable</p> <ul style="list-style-type: none"> • appropriate materials as required for safe erection of structures • appropriate materials for conducting fibre rope slicing, whipping, knots, bends and hitches. <p>Assessment must be conducted using the national OHS endorsed Assessment Instruments. These Instruments provide advice on their application.</p> <p>The use of 'simulators' in the assessment of this unit of competency is not acceptable.</p> <p>Assessment may be in conjunction with the assessment of other units of competency.</p> <p>Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge.</p> <p>Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.</p>
<p>Guidance information for assessment</p>	<p>Further information about endorsed Assessment Instruments may be obtained from state/territory OHS regulators.</p>

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Hazards may include but are not limited to:

- ground stability (e.g. ground condition, recently filled trenches, slopes)
- overhead hazards (e.g. power lines, service pipes) (**NB**: minimum clearance distance from powerlines or electrical equipment as determined by relevant state authority or

RANGE STATEMENT

electrical supply authority.)

- traffic (e.g. pedestrians, vehicles, other plant)
- insufficient lighting
- environmental conditions (e.g. wind, lightning, storms)
- other specific hazards (e.g. dangerous materials).

Hazard control measures:

Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls.

It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk:

- elimination
- substitution
- isolation
- engineering control measures
- using safe work practices
- personal protective equipment.

Appropriate standards may include:

- codes of practice
- legislation
- Australian Standards
- manufacturer's specifications
- industry standards (where applicable).

Site Information may include, but not limited to:

- local conditions such as access and egress,
- work method statements,
- site specific job safety analyses and other site specific documentation as required.
- task plans / Schedules and structural plans.

Forces and Loads may include, but not limited to:

- dead loads
- live loads
- static load
- dynamic loads
- wind loads.

Structures may include but are not limited to:

- structural steel
- precast panels.

Associated plant may include but not limited to:

- static lines
- safety nets
- hoists

RANGE STATEMENT

- Appropriate personnel* may include:
- mast climbers
 - loading platforms.
 - engineers
 - supervisors
 - colleagues
 - managers who are authorised to take responsibility for the workplace or operations.
- Rigging Equipment* may include but is not limited to:
- scaffolds
 - elevated work platforms
 - personnel box
 - cantilevered crane loading platforms
 - mast climbers.
 - safety screens and shutters
 - cranes including but not limited to:
 - non-slewing cranes
 - mobile slewing cranes
 - vehicle loading cranes
 - tower cranes
 - self-erecting tower cranes
 - portal boom cranes
 - derrick cranes
 - bridge and gantry cranes.
- Associated equipment* may include but is not limited to:
- all types of power and manually operated lifting gear
 - fibre ropes
 - flexible steel wire rope (FSWR)
 - chains
 - wire and synthetic slings
 - shackles
 - terminations
 - wedge sockets
 - eye bolts
 - beam clamps
 - plate clamps
 - rope grips
 - turnbuckles
 - rigging screws
 - chain blocks
 - lever blocks
 - lever-action winches

RANGE STATEMENT

- sheaves
 - spreader bars
 - lifting beams
 - jacks
 - levers
 - skates
 - wedges
 - rollers
 - girder trolley
- Procedures** may include but is not limited to:
- manufacturer's guidelines (instructions, specifications or checklists)
 - industry operating procedures, relevant codes of practice
 - workplace procedures (work instructions, operating procedures, checklists).
- Safety Equipment** may include but not limited to:
- safety harness
 - energy absorber
 - lanyard
 - inertia reel
 - static safety lines
 - safety nets.
- Communication Methods** may include but is not limited to:
- verbal and non-verbal language
 - written instructions
 - signage
 - hand signals
 - listening,
 - questioning to confirm understanding, and appropriate worksite protocol.
- NB:** Mobile phones are not to be used for signalling purposes during the rigging process.
- Communication equipment** may include but is not limited to:
- fixed channel two-way radios
- Hazard prevention/control measures** may include but is not limited to:
- safety tags on electrical switches/isolators
 - powerlines are insulated
 - safety observer used inside exclusion zone
 - power disconnected
 - traffic barricades and control
 - pedestrian barricades
 - trench covers

RANGE STATEMENT

- movement of obstructions
 - personal protective equipment
 - adequate illumination
 - safety shutters and screens.
- Ground suitability* may include but is not limited to:
- rough uneven ground
 - backfilled ground
 - soft soils
 - hard compacted soil
 - rock
 - bitumen
 - concrete
 - suspended concrete floors
 - building roofs
 - landings
 - ground bearing pressure.
- Appropriate personnel* may include but not limited to
- other riggers
 - doggers
 - crane operators.
- Temporary connections* may include but not limited to:
- knots
 - bends
 - hitches
 - spicing
 - whipping.
- Flexible Steel Wire Rope (FSWR)* includes:
- identification, uses and connections.
- May include termination for:
- static lines,
 - guys,
 - purchase systems,
 - lashing,
 - cranes,
 - hoist and winch ropes.

Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

Functional area

Functional area

CPCCLRG3002A Licence to perform rigging intermediate level

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit specifies the outcomes required to perform rigging work at the intermediate level, which includes all the outcomes for rigging work at the basic level, and also includes rigging of cranes, rigging of conveyors, rigging of dredges and excavators, rigging associated with tilt slabs, rigging associated with demolition work, and dual lifts for licensing purposes.

Application of the Unit

Application of the unit This unit requires the applicant to be able plan the work, select and inspect equipment, set up task, erect structures and plant and dismantle structures and plant.

This unit is based upon the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

This unit has a pre-requisite requirement. This requirement may be met by either the successful completion of the unit *CPCCLRG3001A Licence to perform rigging basic level* or holding a valid licence for basic rigging.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units

CPCCLRG3001A	Licence to perform rigging basic level
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Employability Skills Information

Employability skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan job.	1.1. Task to be undertaken is assessed 1.2. Potential workplace <i>hazards</i> are identified 1.3. <i>Hazard control measures</i> are identified consistent with <i>appropriate standards</i> to ensure the safety of personnel and equipment 1.4. Site information is obtained 1.5. All <i>forces and loads</i> associated with erecting and dismantling <i>structures</i> and <i>associated plant</i> are considered in consultation with <i>appropriate personnel</i> . 1.6. <i>Rigging equipment</i> and <i>associated equipment</i> are identified in consultation with appropriate personnel according to <i>procedures</i> and site information. 1.7. <i>Safety equipment</i> is identified. 1.8. Appropriate <i>communication methods</i> are identified with appropriate personnel.
2. Select and inspect equipment.	2.1. Rigging equipment and associated equipment are selected and inspected according to procedures and the appropriate standard. 2.2. Safety equipment is selected and inspected according to procedures. 2.3. All defective rigging equipment, associated equipment and safety equipment is isolated, reported and recorded according to procedures. 2.4. <i>Communication equipment</i> is selected and inspected for serviceability (where applicable)
3. Set up tasks.	3.1. Appropriate <i>hazard prevention/control measures</i> are applied to the work area according to procedures. 3.2. <i>Ground suitability</i> is inspected and checked (where appropriate). 3.3. Site information is reviewed, interpreted and communicated to appropriate personnel and <i>appropriate personnel</i> . 3.4. All forces and loads associated with erecting and dismantling structures and associated plant are determined in consultation with appropriate personnel. 3.5. Safety equipment is fitted and worn correctly (where appropriate). 3.6. Rigging equipment and associated plant are

ELEMENT	PERFORMANCE CRITERIA
4. Erect structures and plant.	<p>positioned for work application and stability according to procedures.</p> <p>4.1. Structures and associated plant is erected according to procedures and site information.</p> <p>4.2. Stability of structures and associated plant is maintained during erection according to procedures.</p> <p>4.3. Work is conducted safely at heights including safe and effective use of safety equipment.</p> <p>4.4. Appropriate communication methods and communication equipment, are used to co-ordinate the tasks.</p> <p>4.5. Temporary guys, ties, propping and shoring, including <i>flexible steel wire rope</i>, and tubing, are connected where required.</p> <p>4.6. Associated plant and rigging equipment is used according to procedures and the appropriate standard.</p> <p>4.7. Associated equipment is used in a safe and appropriate manner.</p> <p>4.8. The completed task is inspected according to the appropriate standard.</p> <p>4.9. Excess materials are removed from the work area (where applicable)</p>
5. Dismantle structures and plant.	<p>5.1. Structures and associated plant are dismantled according to procedures and the appropriate standard.</p> <p>5.2. Work is conducted safely at heights including safe and effective use of safety equipment.</p> <p>5.3. Stability of structures and associated plant is maintained during dismantling according to procedures.</p> <p>5.4. Rigging equipment, associated equipment, safety equipment and associated plant are inspected for damage and defects</p> <p>5.5. All defective rigging equipment, associated equipment, associated plant and safety equipment are isolated reported and recorded according to procedures.</p> <p>5.6. Rigging equipment and associated equipment are stored according to procedures and the appropriate standard.</p> <p>5.7. Hazard prevention/control measures are removed</p>

ELEMENT**PERFORMANCE CRITERIA**

(where appropriate)

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- ability to calculate Safe Working Load (SWL) and Working Load Limit (WLL)
- ability to erect and dismantle, level, plumb and stabilise associated plant and structures
- ability to work safely at heights including the correct application of safety equipment.
- accurate interpretation of structural charts and structural plans (site information)
- correct application and use of all rigging and associated equipment
- risk assessment and hazard control strategies
- interpersonal and communication skills at a level sufficient to site/workplace requirements. This includes the relevant communication methods and equipment.
- verify problems and equipment faults and demonstrate appropriate response.

Required knowledge

Required knowledge for this unit is:

- appropriate mathematical procedures for estimation and measurement of loads
- ability to interpret manufacturer's specifications for all plant and equipment use in rigging operations
- knowledge of principles relating to all plant, equipment and structural stability
- knowledge of the types and functions of rigging, safety and associated equipment including an understanding of their limitations
- organisational and workplace standards, requirements, policies and procedures for rigging
- understanding of the hierarchy of hazard identification and control
- relevant Commonwealth, state or territory and local government OHS legislation, standards and codes of practice for undertaking rigging activities
- understanding of inspection and maintenance requirements of a wide range of appropriate plant and equipment in line with Australian Standards or manufacturer's specifications
- estimation of ground bearing pressures of the full range of soil types and associated

REQUIRED SKILLS AND KNOWLEDGE

ground conditions for setting up plant and equipment.

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Successful assessment of this unit meets the competency requirement of the National Standard for licensing Persons Performing High Risk Work.

State/Territory OHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for OHS matters.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of the ability to:

- comply with OHS licensing legislation.
- effectively communicate and work safely with others in the work area.
- effectively conduct risk assessment and management procedures.
- effectively complete the following tasks:
 - adding and removing a tower crane section, or
 - adding and removing a crane lattice boom section, or
 - erecting a non guyed tower (e.g. light tower, and
 - perform a multiple crane lift, or
 - a multiple winch lift, or
 - a combination of a crane and winch lift, and
 - lifting and installing a series of tilt-up panels, or
 - lifting and installing a series of scenery panels (i.e. entertainment industry), and
 - demolish/remove a series of tilt-up panel structures, or
 - demolish/remove a series of scenery panel structures, and
 - demolishing a concrete encased structural steel column and beam.
- **NB:** All specifications for these performance

EVIDENCE GUIDE

Context of and specific resources for assessment

tasks are detailed in the endorsed assessment instrument.

- effectively conduct pre and post operational checks of intermediate rigging equipment.

Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the endorsed Assessment Instrument.

Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting.

Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace.

Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints.

Assessment is to comply with relevant appropriate standard requirements.

Applicants must have access to:

- personal protective equipment (PPE) for the purpose of the Performance Assessment
- appropriate safety equipment in safe condition
- appropriate rigging equipment, associated equipment associated plant in safe condition as described in the endorsed assessment instrument
- communication equipment (e.g. radios) where applicable
- appropriate materials as required for safe erection of structures.

Method of assessment

Assessment must be conducted using the endorsed Assessment Instruments. These Instruments provide advice on their application.

The use of '**simulators**' in the assessment of this unit of competency is **not acceptable**.

Assessment may be in conjunction with the assessment of other units of competency.

EVIDENCE GUIDE

	<p>Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge.</p> <p>Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.</p>
Guidance information for assessment	<p>Further information about endorsed Assessment Instruments may be obtained from state/territory OHS regulators.</p>

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Hazards may include but not limited to:

- ground stability (e.g. ground condition, recently filled trenches, slopes)
- overhead hazards (e.g. power lines, service pipes) (**NB:** Minimum clearance distance from powerlines or electrical equipment as determined by relevant state authority or electrical supply authority)
- traffic (e.g. pedestrians, vehicles, other plant)
- insufficient lighting
- environmental conditions (e.g. wind, lightning, storms)
- other specific hazards (e.g. dangerous materials).

Hazard control measures:

Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls.

It includes the application of the hierarchy of control, the six-step preference of control

RANGE STATEMENT

	measures to manage and control risk:
	<ul style="list-style-type: none"> • elimination • substitution • isolation • engineering control measures • using safe work practices • personal protective equipment.
<i>Appropriate standards</i> may include but are not limited to:	<ul style="list-style-type: none"> • codes of practice • legislation • Australian Standards • manufacturer's specifications • industry standards (where applicable).
<i>Site Information</i> may include but is not limited to:	<ul style="list-style-type: none"> • local conditions such as access and egress • work method statements • site-specific job safety analyses and other site specific documentation as required • task plans /schedules and structural plans.
<i>Forces and Loads</i> may include but are not limited to:	<ul style="list-style-type: none"> • dead loads • live loads • static load • dynamic loads • wind loads.
<i>Structures</i> may include but not limited to:	<ul style="list-style-type: none"> • concrete tilt-up panels • scenery panels (used in entertainment) • non guyed light towers.
<i>Associated plant</i> may include but is not limited to:	<ul style="list-style-type: none"> • all types of cranes • conveyors • dredges • excavators.
<i>Appropriate personnel</i> may include but not limited to:	<ul style="list-style-type: none"> • supervisors • engineers • colleagues • managers who are authorised to take responsibility for the workplace or operations.
<i>Rigging Equipment</i> may include but is not limited to:	<ul style="list-style-type: none"> • scaffolds • elevated work platforms • stages • personnel box • cantilevered crane loading platforms,

RANGE STATEMENT

- mast climbers
 - safety screens and shutters
 - cranes including but not limited to:
 - non-slewing cranes
 - mobile slewing cranes
 - vehicle loading cranes
 - tower cranes
 - self-erecting tower cranes
 - portal boom cranes
 - derrick cranes
 - bridge and gantry cranes.
- Associated equipment* may include but is not limited to:
- all associated equipment at the basic rigging level, and
 - lifting clutches (swift lifts)
 - chain motors.
- Procedures* may include but are not limited to:
- manufacturer's guidelines (instructions, specifications or checklists)
 - industry operating procedures, relevant codes of practice
 - workplace procedures (work instructions, operating procedures, checklists).
- Safety Equipment* may include but not limited to:
- safety harness
 - energy absorber
 - lanyard
 - inertia reel
 - safety nets
 - static lines.
- Communication Methods* may include but not limited to:
- verbal and non-verbal language
 - written instructions
 - signage
 - hand signals
 - listening,
 - questioning to confirm understanding, and appropriate worksite protocol.
- NB:** Mobile phones are not to be used for signalling purposes during the rigging process.
- Communication equipment* may include but is not limited to:
- fixed channel two-way radios
- Hazard prevention/control*
- safety tags on electrical switches/isolators

RANGE STATEMENT

measures may include but is not limited to:

- powerlines are insulated
- safety observer used inside exclusion zone
- power disconnected
- traffic barricades and control
- pedestrian barricades
- trench covers
- movement of obstructions
- personal protective equipment
- adequate illumination.

Ground suitability may include but is not limited to:

- rough uneven ground
- backfilled ground
- soft soils
- hard compacted soil
- rock
- bitumen
- concrete
- suspended concrete floors
- building roofs
- landings
- ground bearing pressure.

Appropriate personnel may include but not limited to:

- other riggers
- doggers
- crane operators.

Flexible Steel Wire Rope (FSWR) includes:

- identification, uses and connections.

May include termination for:

- static lines
- guys
- purchase systems
- lashing
- cranes
- hoist and winch ropes.

Unit Sector(s)

Unit sector

Construction

Co-requisite units

Co-requisite units Nil

Functional area

Functional area

CPCCLSF2001A Licence to erect, alter and dismantle scaffolding basic level

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit specifies the outcomes required to erect, alter and dismantle scaffolding at the basic level, consisting of scaffolding work connected with the operation or use of modular or pre-fabricated scaffolds, cantilevered materials hoists with a maximum working load of 500kg, ropes and gin wheels, safety nets and static lines, and bracket scaffolds (tank and formwork) for licensing purposes.

Application of the Unit

Application of the unit This unit covers the scope of work to plan the job, select and inspect equipment, set up task, erect scaffold and scaffold equipment and dismantle scaffold and scaffold equipment.

This unit is based upon the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form it state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units Nil

Employability Skills Information

Employability skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan job.	1.1. Task to be undertaken is assessed. 1.2. Potential workplace <i>hazards</i> are identified. 1.3. <i>Hazard control measures</i> are identified consistent with <i>appropriate standards</i> to ensure the safety of personnel and equipment. 1.4. Site information is obtained. 1.5. <i>Scaffold, associated equipment and scaffolding equipment</i> are identified from site information and in consultation with <i>appropriate personnel</i> (where applicable). 1.6. <i>Safety equipment</i> is identified. 1.7. All <i>forces and loads</i> exerted on and by the scaffold and/or scaffolding equipment are determined and calculated. 1.8. Appropriate <i>communication methods</i> are identified with appropriate personnel.
2. Select and inspect plant and equipment.	2.1. Scaffold, associated equipment and scaffold equipment are selected and inspected according to <i>procedures</i> and site information. 2.2. Safety equipment is selected and inspected according to procedures. 2.3. All defective Scaffold, associated equipment, scaffold equipment and safety equipment are isolated according to procedures. 2.4. All defective Scaffold, associated equipment, scaffold equipment and safety equipment are reported and recorded according to procedures. 2.5. <i>Communication equipment</i> is selected and inspected for serviceability (where applicable).
3. Set up task	3.1. Appropriate <i>hazard prevention/control measures</i> are applied to the work area according to procedures. 3.2. Ground suitability is checked. 3.3. Appropriate footings are prepared to support scaffold and scaffold equipment according to procedures and the appropriate standard. 3.4. Scaffold and scaffold equipment are prepared for erection according to procedures and the appropriate standard. 3.5. Safety equipment is fitted and secured according to procedures (where applicable).

ELEMENT	PERFORMANCE CRITERIA
4. Erect scaffold and scaffold equipment.	<p>3.6. Scaffold and scaffold equipment are positioned for work application and <i>stability</i> according to procedures and the appropriate standard.</p> <p>4.1. Scaffold and scaffold equipment are erected according to procedures and the appropriate standard.</p> <p>4.2. Work is conducted safely at heights including safe and effective use of safety equipment.</p> <p>4.3. Scaffold and scaffold equipment are erected consistent with site information.</p> <p>4.4. Appropriate communication methods are used to coordinate the tasks.</p> <p>4.5. Completed tasks are inspected for compliance with the appropriate standard.</p> <p>4.6. Handover certificate is completed as required and handed to appropriate personnel.</p> <p>4.7. Excess materials from the work area are removed (where applicable).</p>
5. Dismantle scaffold and scaffold equipment.	<p>5.1. Scaffold and scaffold equipment are dismantled according to procedures and the appropriate standard.</p> <p>5.2. Work is conducted safely at heights including safe and effective use of safety equipment.</p> <p>5.3. Scaffold, associated equipment and scaffold equipment are inspected for damage and defects.</p> <p>5.4. All damaged and defective scaffold, associated equipment and scaffold equipment are tagged and isolated according to procedures.</p> <p>5.5. Hazard prevention/control measures are removed (where appropriate).</p> <p>5.6. All damaged and defective scaffold, associated equipment and scaffold equipment are reported and recorded according to procedures and appropriate action taken.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

REQUIRED SKILLS AND KNOWLEDGE

Required skills

Required skills for this unit are:

- ability to calculate Safe Working Load (SWL) and Working Load Limit (WLL)
- ability to erect scaffold within the scope of the basic scaffolder
- ability to erect, level, plumb and stabilise cantilever hoists and scaffolds
- ability to interpret manufacturer's specifications for plant and equipment
- ability to work safely at heights
- ability to set up fall arrest systems, including safety nets
- ability to work safely in confined spaces
- accurate interpretation of basic structural charts and structural plans
- applying methods for making temporary connection using fibre ropes
- correct application of all scaffolding equipment
- methods for making temporary connection of guy ropes and static lines using Flexible Steel Wire Rope (FSWR)
- verify problems and equipment faults and demonstrate appropriate response.

Required knowledge

Required knowledge for this unit is:

- use of appropriate mathematical procedures for estimation and measurement of loads Commonwealth, state or territory OHS legislation and local government regulations, including standards and codes of practice relevant to the full range of techniques for undertaking basic scaffolding activities
- knowledge of principles relating to plant and equipment stability
- knowledge of types of scaffolding and their application
- knowledge of scaffolding erection and dismantling techniques
- knowledge of types of hoists, plant and equipment associated with basic scaffolding and their use/s
- risk assessment and control, including understanding of the hierarchy of control
- estimation of bearing pressures of the full range of soil types and associated ground conditions for setting up plant and equipment
- load capabilities of different types of scaffolding constructions
- understanding and application of organisational and workplace standards, requirements, policies and procedures for scaffolding
- safety equipment applicable to scaffolding
- understanding and application of the inspection and maintenance requirements for basic scaffold, associated equipment and scaffold equipment
- uses and limitations of tools and equipment, appropriate to scaffolding tasks and activities.

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Successful assessment of this unit meets the competency requirement of the National Standard for licensing Persons Performing High Risk Work.

State/Territory OHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment endorsed by the national body responsible for OHS matters for the assessment of this unit.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of the ability to:

- comply with OHS licensing requirements.
- effectively communicate and work safely with others in the work area.
- effectively apply risk assessment and hazard management procedures at a basic scaffolder level.
- effectively complete the planning, erection and dismantling of a scaffolding system, in accordance with procedures, including a minimum of erect and dismantle:
 - Modular Scaffold with return and ladder access and platform brackets (hop-up brackets)
 - Bracket Scaffold
 - Mobile Scaffold
 - gin wheel
 - Cantilever Hoist
 - safety net and static line
 - safety screen

Scaffold to be of a minimum height of at least 5.0 metres above the supporting surface with full edge protection (includes safety screen) for each work platform including toe boards and handrails.

- correctly demonstrate fibre rope bends and hitches.

EVIDENCE GUIDE

Context of and specific resources for assessment

- effectively conduct pre and post operational checks of basic scaffolding.
- complete handover certificate as required.
- Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the National OHS endorsed Assessment Instrument
- Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting
- Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace
- Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints for basic scaffolding
- Applicants must have access to:
 - personal protective equipment (PPE) for the purpose of the Performance Assessment
 - appropriate safety equipment in safe condition
 - appropriate scaffolding and associated scaffolding equipment
 - communication equipment (e.g. fixed channel two way radios) where applicable
 - appropriate personnel to assist with the erecting and dismantling of scaffold and scaffold equipment.

Method of assessment

Assessment must be conducted using the national OHS endorsed Assessment Instruments. These Instruments provide advice on their application.

Assessment may be in conjunction with the assessment of other units of competency.

The use of '**simulators**' in the assessment of this unit of competency is **not acceptable**.

Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge.

EVIDENCE GUIDE

Guidance information for assessment

Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.

Further information about endorsed Assessment Instruments may be obtained from state/territory OHS regulators.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Hazards may include but not limited to:

- ground conditions (e.g. ground bearing pressure/s, back filled trenches, underground services, slopes)
- overhead hazards (e.g. power lines, service pipes) (minimum clearance distance from powerlines or electrical equipment as determined by relevant state authority or electrical supply authority)
- traffic (e.g. pedestrians, vehicles, other plant)
- insufficient lighting
- environmental conditions (e.g. wind, lightning, storms)
- other site specific hazards (e.g. hazardous materials).

Hazard control measures:

Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls.

It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk:

- elimination

RANGE STATEMENT

<p><i>Appropriate standards</i> may include:</p>	<ul style="list-style-type: none"> • substitution • isolation • engineering control measures • using safe work practices • personal protective equipment. • codes of practice • legislation • Australian Standards • manufacturer's specifications • industry standards (where applicable).
<p><i>Site Information</i> may include, but not be limited to:</p>	<ul style="list-style-type: none"> • local conditions such as access and egress • work method statements • site-specific job safety analyses and other documentation as required • task plans.
<p><i>Scaffold</i> may include but not limited to:</p>	<ul style="list-style-type: none"> • mobile scaffolding • bracket scaffolding • modular scaffolding, including: <ul style="list-style-type: none"> • steel • fibreglass and • aluminium frame scaffolding • prefabricated scaffolding.
<p><i>Associated equipment</i> may include but not limited to:</p>	<ul style="list-style-type: none"> • planks • flexible steel wire rope and fittings. <p>NB: including identification, uses and connections which may include termination for static lines and guys for cantilever hoists.</p> <ul style="list-style-type: none"> • ladders • tie tubes and fittings • fibre rope <p>NB: including identification and uses (natural and synthetic), and connections associated with bends and hitches.</p> <ul style="list-style-type: none"> • stairways and screening • hand tools, including, but not limited to: <ul style="list-style-type: none"> • box spanners • hammers • spirit levels • tape measures

RANGE STATEMENT

- scaffold belts
 - podgers
 - hammers
 - wire nips
 - wrenches
 - torpedo levels
 - shovels
 - spanners
 - cutters
 - hammer drills
 - sledge hammers
 - wheel barrows and
 - relevant maintenance equipment.
- Scaffolding equipment* may include but not limited to:
- materials hoists
 - gin wheels
 - safety nets
 - static lines and fittings.
- Appropriate personnel* may include, but are not limited to:
- supervisors
 - colleagues
 - managers who are authorised to take responsibility for the workplace or operations
 - other scaffolders
 - other site personnel as applicable.
- Safety equipment* may include but not limited to:
- safety harness
 - energy absorber
 - lanyard
 - inertia reel.
- Forces and Loads* may include, but are not limited to:
- dead loads
 - live loads
 - static load
 - dynamic loads
 - wind loads.
- Communication Methods* may include but not limited to:
- verbal and non-verbal language
 - written instructions
 - signage
 - communication signals
 - listening
 - questioning to confirm understanding, and appropriate worksite protocol.

RANGE STATEMENT

Procedures may include but not limited to:

- manufacturer's guidelines (instructions, specifications or checklists)
- industry operating procedures, relevant codes of practice
- workplace procedures (work instructions, operating procedures, checklists)
- reporting and recording procedures such as e.g. equipment defect/s.

Communication equipment may include but is not limited to:

- fixed frequency two way radios
- mobile phones.

Hazard prevention/control measures may include but not limited to:

- safety tags on electrical switches/isolators
- safety observer used inside exclusion zone (e.g. Spotter), to include the use of power line warning systems (e.g. Tiger tails)
- power disconnected by competent authority where applicable
- traffic and pedestrian barricades and controls
- safe and adequate access / egress is established
- personal protective equipment
- adequate illumination.

Ground suitability may include but not limited to:

- rough uneven ground
- backfilled ground
- soft soils
- hard compacted soil
- rock
- bitumen
- concrete.

Stability may include but is not limited to:

- ground bearing pressure
- sole plates/boards
- screw jacks
- levelling
- ties/guys.

Unit Sector(s)

Unit sector

Construction

Co-requisite units

Co-requisite units Nil

Functional area

Functional area

CPCCLSF3001A Licence to erect, alter and dismantle scaffolding intermediate level

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit specifies the outcomes required to erect, alter and dismantle scaffolding at the Intermediate level which includes use and operation of Cantilevered crane-loading platforms, Cantilevered and spurred scaffolds, Barrow ramps and sloping platforms, perimeter safety screens and shutters Mast climbers, and tube and coupler scaffolds (including tube and coupler covered ways and gantries) for licensing purposes.

Application of the Unit

Application of the unit This unit covers the scope of work to plan the job, select and inspect equipment, set up task, erect scaffold and scaffold equipment and dismantle scaffold and scaffolding equipment.

This unit is based upon the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

This unit has a pre-requisite requirement. This requirement may be met by either the successful completion of the unit *CPCCLSF2001A Licence to erect, alter and dismantle scaffolding basic level* or holding a valid licence for basic scaffolding.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units

CPCCLSF2001A	Licence to erect, alter and dismantle scaffolding basic level
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Prerequisite units

Employability Skills Information

Employability skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan job.	<p>1.1. Task to be undertaken is assessed.</p> <p>1.2. Potential workplace <i>hazards</i> are identified.</p> <p>1.3. <i>Hazard control measures</i> are identified consistent with <i>appropriate standards</i> to ensure the safety of personnel and equipment.</p> <p>1.4. Site information is obtained.</p> <p>1.5. <i>Scaffold, associated equipment and scaffold equipment</i> are identified from site information and in consultation with appropriate <i>personnel</i> (where applicable).</p> <p>1.6. <i>Safety equipment</i> is identified.</p> <p>1.7. All <i>forces and loads</i> exerted on and by the scaffold and/or scaffolding equipment are determined and calculated.</p> <p>1.8. Appropriate <i>communication methods</i> are identified with appropriate personnel.</p>
2. Select and inspect equipment.	<p>2.1. Scaffold, associated equipment and scaffold equipment are selected and inspected according to <i>procedures</i> and site information.</p> <p>2.2. Safety equipment is selected and inspected according to procedures.</p> <p>2.3. All defective scaffold, associated equipment, scaffold equipment and safety equipment are isolated according to procedures.</p> <p>2.4. All defective scaffold, associated equipment, scaffold equipment and safety equipment are reported and recorded according to procedures.</p> <p>2.5. <i>Communication equipment</i> is selected and inspected for serviceability (where applicable).</p>
3. Set up task.	<p>3.1. Appropriate <i>hazard prevention/control measures</i> are applied to the work area according to procedures.</p> <p>3.2. Ground suitability is checked.</p> <p>3.3. Appropriate footings are prepared to support scaffold and scaffold equipment according to procedures and the appropriate standard.</p> <p>3.4. Scaffold and scaffold equipment are prepared for erection</p> <p>3.5. Fit safety equipment and secure according to procedures (where applicable).</p> <p>3.6. Scaffold and scaffold equipment are positioned for</p>

ELEMENT	PERFORMANCE CRITERIA
4. Erect scaffold and scaffolding equipment.	<p>work application and <i>stability</i> according to procedures and the appropriate standard.</p> <p>4.1. Scaffold and scaffold equipment are erected according to procedures and the appropriate standard.</p> <p>4.2. Work is conducted safely at heights including safe and effective use of safety equipment.</p> <p>4.3. Scaffold and scaffold equipment are erected consistent with site information.</p> <p>4.4. Appropriate communication methods are used to coordinate the tasks.</p> <p>4.5. Completed tasks are inspected for compliance with the appropriate standard.</p> <p>4.6. Handover certificate is completed as required and handed to appropriate personnel.</p> <p>4.7. Excess materials from the work area are removed (where applicable).</p>
5. Dismantle scaffold and scaffolding equipment.	<p>5.1. Scaffold and scaffold equipment are dismantled according to procedures and the appropriate standard.</p> <p>5.2. Work is conducted safely at heights including safe and effective use of safety equipment.</p> <p>5.3. Scaffold, associated equipment and scaffold equipment are inspected for damage and defects.</p> <p>5.4. All damaged and defective scaffold, associated equipment and scaffold equipment are tagged and isolated according to procedures.</p> <p>5.5. Hazard prevention/control measures are removed (where appropriate).</p> <p>5.6. All damaged and defective scaffold, associated equipment and scaffold equipment are reported and recorded according to procedures and appropriate action taken.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

REQUIRED SKILLS AND KNOWLEDGE

Required skills

Required skills for this unit are:

- ability to erect scaffold and scaffolding equipment within the scope of the intermediate scaffolder
- ability to erect, level, plumb and stabilise scaffolds and scaffold equipment within the scope of the intermediate scaffolder
- ability to interpret manufacturer's specifications for plant and equipment
- ability to work safely at heights
- accurate interpretation of basic structural charts and structural plans
- correct application of all scaffolding equipment
- verify problems and equipment faults and demonstrate appropriate response.

Required knowledge

Required knowledge for this unit is:

- use of appropriate mathematical procedures for estimation and measurement of loads
- Commonwealth, state or territory OHS legislation and local government regulations, including standards and codes of practice relevant to the full range of techniques for undertaking intermediate scaffolding activities
- knowledge of principles relating to plant and equipment stability
- knowledge of types of scaffolding and their application
- knowledge of scaffold and scaffold equipment erection and dismantling techniques
- knowledge of types of scaffold and scaffold equipment, associated with intermediate scaffolding and their use/s
- risk assessment and control, including understanding of the hierarchy of control
- load capabilities of different types of scaffolding constructions
- understanding and application of organisational and workplace standards, requirements, policies and procedures for scaffolding
- application of safety equipment applicable to scaffolding
- understanding and application of the inspection and maintenance requirements for intermediate scaffold, associated equipment and scaffold equipment
- uses and limitations of tools and equipment, appropriate to scaffolding tasks and activities.

Evidence Guide

EVIDENCE GUIDE

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Successful assessment of this unit meets the competency requirement of the National Standard for licensing Persons Performing High Risk Work.

State/Territory OHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment endorsed by the national body responsible for OHS matters for the assessment of this unit.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of the ability to:

- Effectively communicate and work safely with others in the work area.
- Effectively apply risk assessment and hazard management procedures at an intermediate scaffolder level.
- Effectively complete the planning, erection and dismantling of scaffolding systems, in accordance with procedures, including a minimum of erect and dismantle the following:
 - Cantilevered and spurred scaffolds
 - Barrow ramps and/ or sloping platforms
 - Tube and coupler scaffolds
 - Cantilevered crane-loading platforms
 - Mast climbers

Cantilevered, spurred and tube and coupler scaffolds to be of a minimum height of 5.0 metres above the supporting surface with full edge protection, for each work platform including toe boards and handrails.

- Apply safety screen to tube and coupler scaffold.
- Effectively conduct compliance inspections of scaffold and scaffold equipment for intermediate scaffolding.
- Complete handover certificate as required.
- Assessment of the safe and effective

Context of and specific

EVIDENCE GUIDE

resources for assessment

application of knowledge and skill to workplace tasks (performance) must be undertaken using the National OHS endorsed Assessment Instrument.

- Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting.
- Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace.
- Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints for intermediate scaffolding.
- Applicants must have access to:
 - personal protective equipment (PPE) for the purpose of the Performance Assessment
 - appropriate safety equipment in safe condition
 - appropriate scaffold and scaffold equipment in safe condition
 - site information as described in the mandated assessment instrument
 - communication equipment (e.g. fixed channel two way radios) where applicable
 - appropriate personnel to assist with the erecting and dismantling of scaffold and scaffold equipment.

Method of assessment

Assessment must be conducted using the national OHS endorsed Assessment Instruments. These Instruments provide advice on their application.

Assessment may be in conjunction with the assessment of other units of competency.

The use of '**simulators**' in the assessment of this unit of competency is **not acceptable**.

Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge.

Assessment must confirm a reasonable inference that competency is not only able to be satisfied

EVIDENCE GUIDE

	under the particular circumstance, but is able to be transferred to other circumstances.
Guidance information for assessment	Further information about endorsed assessment instruments may be obtained from state/territory OHS regulators.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Hazards may include but not limited to:

- ground conditions (e.g. ground bearing pressure/s, back filled trenches, underground services, slopes)
- overhead hazards (e.g. power lines, service pipes) (minimum clearance distance from powerlines or electrical equipment as determined by relevant state authority or electrical supply authority.)
- traffic (e.g. pedestrians, vehicles, other plant)
- insufficient lighting
- environmental conditions (e.g. wind, lightning, storms)
- other site specific hazards (e.g. hazardous materials).

Hazard control measures:

Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls.

It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk:

- elimination
- substitution
- isolation

RANGE STATEMENT

<i>Appropriate standards</i> may include:	<ul style="list-style-type: none"> • engineering control measures • using safe work practices • personal protective equipment. • codes of practice • legislation • Australian Standards • manufacturer's specifications • industry standards (where applicable).
<i>Site Information</i> may include, but not limited to:	<ul style="list-style-type: none"> • local conditions such as access and egress • work method statements • site-specific job safety analyses and other documentation as required • task plans.
<i>Scaffold</i> may include but not limited to:	<ul style="list-style-type: none"> • all scaffolds at the basic level • cantilevered and spurred scaffolds • barrow ramps and sloping platforms • tube and coupler scaffolds (including tube and coupler covered ways and gantries) • cantilever loading platforms.
<i>Associated equipment</i> may include but not limited to:	<ul style="list-style-type: none"> • all associated equipment from basic scaffolding level • independent adjustable props.
<i>Scaffold equipment</i> may include but not limited to:	<ul style="list-style-type: none"> • all scaffold equipment at the basic level • mast climbers • screen and shutters.
<i>Appropriate personnel</i> may include, but are not limited to:	<ul style="list-style-type: none"> • supervisors • colleagues • managers who are authorised to take responsibility for the workplace or operations • other scaffolders • other site personnel as applicable.
<i>Safety equipment</i> may include but not limited to:	<ul style="list-style-type: none"> • safety harness • energy absorber • lanyard • inertia reel.
<i>Forces and Loads</i> may include, but are not limited to:	<ul style="list-style-type: none"> • dead loads • live loads • static load • dynamic loads • wind loads.

RANGE STATEMENT

<p><i>Communication Methods</i> may include but not limited to:</p>	<ul style="list-style-type: none"> • verbal and non-verbal language • written instructions • signage • communication signals • listening • questioning to confirm understanding, and appropriate worksite protocol.
<p><i>Procedures</i> may include but not limited to:</p>	<ul style="list-style-type: none"> • manufacturer's guidelines (instructions, specifications or checklists) • industry operating procedures, relevant codes of practice • workplace procedures (work instructions, operating procedures, checklists) • reporting and recording procedures such as e.g. scaffold and scaffold equipment defects.
<p><i>Communication equipment</i> may include but not limited to:</p>	<ul style="list-style-type: none"> • fixed frequency two way radios • mobile phones.
<p><i>Hazard prevention/control measures</i> may include but not limited to:</p>	<ul style="list-style-type: none"> • safety tags on electrical switches/isolators • safety observer used inside exclusion zone (e.g. Spotter), to include the use of power line warning systems (e.g. Tiger tails) • power disconnected by competent authority where applicable. • traffic and pedestrian barricades and controls • safe and adequate access / egress is established • personal protective equipment • adequate illumination.
<p><i>Ground suitability</i> may include but not limited to:</p>	<ul style="list-style-type: none"> • rough uneven ground • backfilled ground • soft soils • hard compacted soil • rock • bitumen • concrete.
<p><i>Stability</i> may include but not limited to:</p>	<ul style="list-style-type: none"> • ground bearing pressure • sole plates/boards • screw jacks • levelling • ties/guys.

Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

Functional area

Functional area

CPCCOHS1001A Work safely in the construction industry

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit of competency specifies the outcomes required to undertake Occupational Health and Safety (OHS) induction training within the construction industry.

It requires the ability to demonstrate personal awareness of OHS legislative requirements, and the basic principles of risk management and prevention of injury and illness in the construction industry.

Licensing requirements will apply to this unit of competency depending on the regulatory requirements of each jurisdiction.

Application of the Unit

Application of the unit This unit of competency supports the attainment of the basic OHS knowledge required prior to undertaking designated work tasks within any of the sectors within the construction industry. The unit relates directly to the general induction training program specified by the *National Code of Practice for Induction for Construction Work* (ASCC 2007).

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units Nil

Employability Skills Information

Employability skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Identify OHS legislative requirements.	1.1. Applicable <i>OHS legislative requirements</i> relevant to own work, role and responsibilities are identified and explained. 1.2. Duty of care requirements are identified. 1.3. Own responsibilities to comply with <i>safe work practices</i> are identified and explained.
2. Identify construction hazards and control measures.	2.1. Basic principles of risk management are identified. 2.2. <i>Common construction hazards</i> are identified and discussed. 2.3. <i>Measures for controlling</i> hazards and risks are identified.
3. Identify OHS communication and reporting processes.	3.1. OHS communication processes, information and documentation are identified and discussed. 3.2. Role of <i>designated OHS personnel</i> is identified and explained. 3.3. <i>Safety signs and symbols</i> are identified and explained. 3.4. Procedures and <i>relevant authorities</i> for reporting hazards, <i>incidents</i> and injuries are identified.
4. Identify OHS incident response procedures.	4.1. <i>General procedures</i> for responding to incidents and <i>emergencies</i> are identified and explained. 4.2. Procedures for accessing first aid are identified. 4.3. Requirements for the selection and use of relevant <i>personal protective equipment</i> are identified and demonstrated. 4.4. <i>Fire safety equipment</i> is identified and discussed.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- communication skills to:
 - clarify OHS legislative requirements

REQUIRED SKILLS AND KNOWLEDGE

- verbally report construction hazards and risks
- ask effective questions
- relay information to others
- discuss OHS issues and information
- comprehension skills to:
 - explain the basic OHS legislative requirements which will be applicable to own work
 - explain the meaning of safety signs and symbols
 - identify common construction hazards
 - discuss the basic principles of risk management.

Required knowledge

Required knowledge for this unit is:

- applicable Commonwealth, State or Territory OHS legislation, regulations, standards, codes of practice and industry standards/guidance notes relevant to own work, role and responsibilities
- basic principles of risk management and assessment for construction work
- common construction hazards
- common construction safety signage and its meanings
- general construction emergency response and evacuation procedures
- general construction work activities that require licenses, tickets or certificates of competency
- general first aid response requirements
- general procedures for raising OHS issues
- general procedures for reporting OHS hazards, accidents, incidents, emergencies, injuries, near misses and dangerous occurrences
- general procedures for responding to hazards, incidents and injuries
- general workers' compensation and injury management requirements
- OHS hierarchy of controls
- OHS responsibilities and rights of duty holders, including:
 - persons in control of construction work/projects
 - employers and self-employed persons
 - supervisors
 - employees
 - designers
 - inspectors
 - manufacturers and suppliers
- own responsibilities to comply with safe work practices relating to:
 - housekeeping

REQUIRED SKILLS AND KNOWLEDGE

- identification of hazards
- preventing bullying or harassment
- smoking
- use of amenities
- use of drugs and alcohol
- role of OHS committees and representatives
- types of common personal protective equipment and fire safety equipment
- types of OHS information and documentation.

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Evidence must confirm personal awareness of the following:

- applicable OHS legislative and safety requirements for construction work including duty of care
- the range of common construction hazards and procedures for the assessment of risk and application of the hierarchy of control
- OHS communication processes, information and documentation including the role of OHS committees and representatives, the meaning of common safety signs and symbols, and procedures for reporting hazards, incidents and injuries
- general procedures for responding to incidents and emergencies including evacuation, first aid, fire safety equipment and PPE.

Context of and specific resources for assessment

- Resources must be available to support the program including participant materials and other information or equipment related to the skills and knowledge covered by the program.
- It is recommended that the assessment tool designed specifically to support this unit of competency will provide consistency in assessment outcomes.
- Where applicable, physical resources should include equipment modified for people with disabilities
- Access must be provided to appropriate assessment support when required.
- Assessment processes and techniques must be culturally appropriate, and appropriate to the oracy, language and literacy capacity of the assessee and the work being performed
- In all cases where practical assessment is used it will be combined with targeted questioning to assess the underpinning knowledge.

EVIDENCE GUIDE

Questioning will be undertaken in such a manner as is appropriate to the oracy, language and literacy levels of the operator, any cultural issues that may affect responses to the questions, and reflecting the requirements of the competency and the work being performed.

Method of assessment

Assessment methods may include more than one of the following:

- practical assessment
- oral questioning
- written test
- work-based activities
- simulated project based activity

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

OHS legislative requirements relate to:

- Australian standards
- construction industry OHS standards and guidelines
- duty of care
- health and safety representatives, committees and supervisors
- licences, tickets or certificates of competency
- National Code of Practice for Induction Training for Construction Work
- national safety standards
- OHS and welfare Acts and regulations
- safety codes of practice.

Duty of care requirements relate to:

- legal responsibility under duty of care to do everything reasonably practicable to protect others from harm

RANGE STATEMENT

- Safe work practices* include:
- own responsibilities to comply with safe work practices, including activities that require licences, tickets or certificates of competency
 - relevant state OHS requirements, including employers and self-employed persons, persons in control of the work site, construction supervisors, designers, manufacturers and suppliers, construction workers, subcontractors and inspectors.
- Risk* relates to:
- access to site amenities, such as drinking water and toilets
 - general requirements for safe use of plant and equipment
 - general requirements for use of personal protective equipment and clothing
 - housekeeping to ensure a clean, tidy and safer work area
 - no drugs and alcohol at work
 - preventing bullying and harassment
 - smoking in designated areas
 - storage and removal of debris.
 - likelihood of a hazard causing injury or harm.
- Principles of risk management* include:
- assessing the risks involved
 - consulting and reporting ensuring the involvement of relevant workers
 - controlling the hazard
 - identifying hazards
 - reviewing to identify change or improvement.
- Hazard* relates to:
- any thing (including an intrinsic property of a thing) or situation with the potential to cause injury or harm.
- Common construction hazards* include:
- confined spaces
 - electrical safety
 - excavations, including trenches
 - falling objects
 - hazardous substances and dangerous goods
 - HIV and other infectious diseases
 - hot and cold working environments
 - manual handling
 - noise
 - plant and equipment

RANGE STATEMENT

Measures for controlling risk to eliminate or minimise hazards in accordance with the hierarchy of control include:

- traffic and mobile plant
- unplanned collapse
- ultraviolet (UV) radiation
- working at heights.

OHS communication processes include:

- elimination
- substitution
- isolation
- engineering control
- administrative control
- personal protective equipment.
- discussions with OHS representatives
- OHS meetings
- OHS notices, newsletters, bulletins and correspondence
- OHS participative arrangements
- processes for raising OHS issues
- toolbox talks
- workplace consultation relating to OHS issues and changes.

OHS information and documentation includes:

- accident and incident reports
- Acts and regulations
- Australian standards
- codes of practice
- construction documentation and plans
- emergency information contact
- evacuation plans
- guidance notes
- job safety analyses
- labels
- material safety data sheets (MSDS)
- proformas for reporting hazards, incidents and injuries
- reports of near misses and dangerous occurrences
- risk assessments
- safe work method statements
- safety meeting minutes
- site safety inspection reports.

Designated OHS personnel includes:

- first aid officers
- OHS committee members

RANGE STATEMENT

- Safety signs and symbols*** include:
- OHS representatives
 - supervisors.
 - emergency information signs (e.g. exits, equipment and first aid)
 - fire signs (e.g. location of fire alarms and firefighting equipment)
 - hazard signs (e.g. danger and warning)
 - regulatory signs (e.g. prohibition, mandatory and limitation or restriction)
 - safety tags and lockout (e.g. danger tags, out of service tags).
- Relevant authorities*** include:
- emergency services (e.g. police, ambulance, fire brigade and emergency rescue)
 - OHS regulatory authority
 - supervisor.
- Incidents*** include:
- accidents resulting in personal injury or damage to property
 - near misses or dangerous occurrences which do not cause injury but may pose an immediate and significant risk to persons or property, and need to be reported so that action can be taken to prevent recurrence, for example:
 - breathing apparatus malfunctioning to the extent that the user's health is in danger
 - collapse of the floor, wall or ceiling of a building being used as a workplace
 - collapse or failure of an excavation more than 1.5 metres deep (including any shoring)
 - collapse or partial collapse of a building or structure
 - collapse, overturning or failure of the load bearing of any scaffolding, lift, crane, hoist or mine-winding equipment
 - damage to or malfunction of any other major plant
 - electric shock.
 - electrical short circuit, malfunction or explosion
 - uncontrolled explosion, fire or escape of gas, hazardous substance or steam
 - any other unintended or uncontrolled incident or event arising from operations carried on at a

RANGE STATEMENT

	workplace.
General procedures for responding to incidents and emergencies include:	<ul style="list-style-type: none"> • basic emergency response (keep calm, raise alarm, obtain help) • evacuation • notification of designated OHS personnel and authorities • notification of emergency services (e.g. when and how) • referring to site emergency plans and documentation.
Emergencies include:	<ul style="list-style-type: none"> • chemical spill • fire • injury to personnel • structural collapse • toxic and/or flammable vapours emission • vehicle/mobile plant accident.
Personal protective equipment includes:	<ul style="list-style-type: none"> • aprons • arm guards • eye protection • gloves • hard hat • hearing protection • high visibility retro reflective vests • protective, well fitting clothing • respiratory protection • safety footwear • UV protective clothing and sunscreen.
Fire safety equipment includes:	<ul style="list-style-type: none"> • breathing apparatus • fire blankets • firefighting equipment.

Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

Functional area

Functional area

FPIHAR2206B Operate a mobile chipper/mulcher

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit describes the outcomes required to operate a mobile chipping/mulching unit to clean up after felling operations and chip excess branches and timber refuse

General workplace legislative and regulatory requirements apply to this unit; however there are no specific licensing or certification requirements at the time of publication

This unit replaces FPIHAR2206A Operate a mobile chipper/mulcher

Application of the Unit

Application of the unit The unit involves operating a mobile chipper/mulcher in a forest and forest products setting

The skills and knowledge required for competent workplace performance are to be used within the scope of the person's job and authority

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units

Employability Skills Information

Employability skills This unit contains employability skills

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for mobile chipping/mulching	<p>1.1. Applicable <i>Occupational Health and Safety</i> (OHS), <i>environmental</i>, <i>legislative</i> and <i>organisational requirements</i> relevant to operating a mobile chipper/mulcher are identified and followed</p> <p>1.2. <i>Work order</i> is reviewed and checked with <i>appropriate personnel</i></p> <p>1.3. Type and quantity of <i>timber refuse</i> to be <i>chipped/mulched</i> are identified and assessed for safe working conditions</p> <p>1.4. Timber refuse assessed as not suitable for chipping/mulching is set aside for recycling or re-use in line with site procedures</p> <p>1.5. <i>Equipment</i> is selected appropriate to work requirements and checked for operational effectiveness in line with manufacturer's recommendations</p> <p>1.6. Chipping/mulching activities are planned in line with site procedures, environmental requirements</p> <p>1.7. <i>Communication</i> with others is established and maintained in line with OHS requirements</p>
2. Chip/mulch timber	<p>2.1. <i>Chipping/mulching unit</i> is positioned, secured and set up in line with manufacturer's specifications</p> <p>2.2. <i>Pre start-up checks</i> are carried out on equipment in line with site requirements</p> <p>2.3. Timber refuse is fed into the chipper/mulcher at a rate applicable to the <i>capacity</i> of the machinery in line with applicable safe handling techniques</p> <p>2.4. Timber refuse is chipped to the <i>chip sizes</i> set on the chipping unit and in line with the work order</p> <p>2.5. Chipping/mulching processes and equipment faults are <i>recorded and reported</i> to the appropriate personnel</p>
3. Conduct operator maintenance	<p>3.1. Equipment lock-out procedures are followed in line with OHS legislation and site procedures</p> <p>3.2. Chipper/mulcher is checked for blunt or damaged condition</p> <p>3.3. Components are removed, maintained, adjusted and replaced in line with manufacturer's recommendations</p> <p>3.4. Chipper/mulcher set-up is assessed and adjusted to suit chipping conditions</p>

ELEMENT**PERFORMANCE CRITERIA**

- 3.5. Chipper/mulcher is kept clear of *foreign matter* and checked to ensure it meets relevant standards prior to use

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level required for this unit

Required skills

- Technical skills sufficient to use and maintain relevant tools, machinery and equipment; efficiently and safely operating a mobile chipper/mulcher
- Communication skills and interpersonal techniques sufficient to interact appropriately with colleagues and others in the workplace
- Literacy skills sufficient to accurately locate, record and report information
- Numeracy skills sufficient to estimate measure and calculate time required to complete a task
- Problem solving skills sufficient to review and accurately identify work requirements; identify problems and equipment faults and demonstrate appropriate response procedures

Required knowledge

- Applicable Commonwealth, State or Territory legislation, regulations, standards, codes of practice and established safe practices relevant to the full range of processes for operating a mobile chipper/mulcher
- Environmental protection requirements, including the safe disposal of waste material and the cleaning of plant, tools and equipment
- Organisational and site standards, requirements, policies and procedures for operating a mobile chipper/mulcher
- Characteristics of trees and timber defects
- Chipping/mulching procedures
- Mobile chipper/mulcher operation and safety
- Chipper/mulcher condition assessment
- Social/community benefit of uses for chipped/mulched timber
- Established communication channels and protocols
- Problem identification and resolution strategies and common fault finding techniques
- Types of tools and equipment and procedures for their use, operation and maintenance
- Appropriate mathematical procedures for estimating and measuring, including

REQUIRED SKILLS AND KNOWLEDGE

- calculating time to complete tasks
- Procedures for recording and reporting workplace records and information

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

A person who demonstrates competency in this unit must be able to provide evidence that they can safely and efficiently operate a mobile chipper/mulcher within organisational requirements

Critical aspects for assessment and evidence required to demonstrate competency in this unit

The evidence required to demonstrate competency in this unit must be relevant to, and satisfy, all of the requirements of the elements of this unit and include demonstration of:

- following applicable Commonwealth, State or Territory legislative and regulatory requirements and codes of practice relevant to operating a mobile chipper/mulcher
- following organisational policies and procedures relevant to operating a mobile chipper/mulcher
- operating a mobile chipper/mulcher in line with the work order and within prescribed organisational tolerances
- conducting operator maintenance on a mobile chipping unit

Context of and specific resources for assessment

- Competency is to be assessed in the workplace or realistically simulated workplace
- Assessment is to occur under standard and authorised work practices, safety requirements and environmental constraints
- Assessment of required knowledge, other than confirmatory questions, will usually be conducted in an off-site context
- Assessment is to follow relevant regulatory or Australian Standards requirements
- The following resources should be made available:
 - workplace location or simulated workplace
 - materials and equipment relevant to undertaking work applicable to this unit
 - specifications and work instructions

Method of assessment

- Assessment must satisfy the endorsed Assessment Guidelines of the FPI11 Training Package
- Assessment methods must confirm consistency and

EVIDENCE GUIDE

accuracy of performance (over time and in a range of workplace relevant contexts) together with application of required knowledge

- Assessment must be by direct observation of tasks, with questioning on required knowledge and it must also reinforce the integration of employability skills
- Assessment methods must confirm the ability to access and correctly interpret and apply the required knowledge
- Assessment may be applied under project-related conditions (real or simulated) and require evidence of process
- Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances
- Assessment may be in conjunction with assessment of other units of competency
- The assessment environment should not disadvantage the candidate
- Assessment practices should take into account any relevant language or cultural issues related to Aboriginality, gender or language backgrounds other than English
- Where the participant has a disability, reasonable adjustment may be applied during assessment
- Language and literacy demands of the assessment task should not be higher than those of the work role

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. **Italicised** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

OHS requirements: are to be in line with applicable Commonwealth, State or Territory legislation and regulations, and

RANGE STATEMENT

organisational safety policies and procedures, and may include:

- personal protective equipment and clothing
- safety equipment
- first aid equipment
- fire fighting equipment
- hazard and risk control
- fatigue management
- elimination of hazardous materials and substances
- safe forest practices including required actions relating to forest fire
- manual handling including shifting, lifting and carrying
- legislation
- organisational policies and procedures
- workplace practices

Environmental requirements
may include:

Legislative requirements:

are to be in line with applicable Commonwealth, State or Territory legislation, regulations, certification requirements and codes of practice and may include:

- award and enterprise agreements
- industrial relations
- Australian Standards
- confidentiality and privacy
- OHS
- the environment
- equal opportunity
- anti-discrimination
- relevant industry codes of practice
- duty of care

Organisational requirements
may include:

- legal
- organisational and site guidelines
- policies and procedures relating to own role and responsibility
- quality assurance
- procedural manuals
- quality and continuous improvement processes and standards
- OHS, emergency and evacuation procedures

RANGE STATEMENT

- ethical standards
 - recording and reporting requirements
 - equipment use and maintenance and storage requirements
 - environmental management requirements (waste disposal, recycling and re-use guidelines)
- Work order** is to include:
- instructions for the chipping/mulching and despatch of chipped/mulched timber refuse from the work site
- and may include:
- type
 - size
 - length
 - quantity
 - grade
- and may also include:
- instructions for the environmental monitoring of work and procedures
 - environmental care requirements relevant to the work
- Appropriate personnel** may include:
- supervisors
 - suppliers
 - clients
 - colleagues
 - managers
- Timber refuse** may include:
- branches
 - tree heads
 - bark
 - other timber waste
- Chipping/mulching** is the process of converting timber refuse into varying chip sizes using mechanised chipping/mulching units
- Equipment** may include:
- mobile chipping/mulching units
 - specific safety attire
 - maintenance tools and equipment
- and is to include procedures for equipment lock-out, such as protecting operators and co-workers from accidental injury by isolating the

RANGE STATEMENT

	machine
Communication may include:	<ul style="list-style-type: none">• verbal and non-verbal language• hand or other agreed signals• eye contact with other operators or personnel• active listening• questioning to clarify and confirm understanding• use of electronic communication devices
Chipping/mulching unit may include:	<ul style="list-style-type: none">• a truck mounted chipping/mulching unit or trailer mounted chipping/mulching unit feeding into a truck or other form of transportation <p>and is usually petrol driven, with high powered spinning cutters which shred timber refuse into chips/mulch</p>
Pre start-up checks	are conducted to ensure: <ul style="list-style-type: none">• equipment has been set-up correctly• systems are performing accurately and operating to optimum performance
Capacity may include:	<ul style="list-style-type: none">• the capacity of the machinery to cope with certain size diameters of branch• the speed by which waste is fed into the chipper/mulcher
Chip sizes	may vary in size, dependent on the customer or work order and the capability of the chipper/mulcher to set chip sizes
Records and reports may include:	<ul style="list-style-type: none">• timber type• size• outcomes• storage locations• quality outcomes• hazards• incidents• equipment malfunctions <p>and may be compiled manually or by using a computer-based system or another appropriate organisational communication system</p>
Foreign matter may include:	<ul style="list-style-type: none">• contamination of chip• stones

RANGE STATEMENT

- rocks
- metal
- other foreign matter which may blunt the cutters or affect operation of the chipper/mulcher

Unit Sector(s)

Unit sector No sector assigned

Co-requisite units

Co-requisite units

Competency field

Competency field Harvesting and Haulage

HLTAID001 Provide cardiopulmonary resuscitation

Modification History

Release	Notes
Release 4	Updated mapping information. Changes to assessment requirements. Equivalent outcome.
Release 3	Updated mapping information. Equivalent outcome.
Release 2	Updated mapping information. Equivalent outcome.
Release 1	<p>This version was released in <i>HLT Health Training Package release 1.0</i> and meets the requirements of the New Standards for Training Packages.</p> <p>Significant changes to elements and performance criteria</p> <p>Revised evidence requirements, including volume and frequency of assessment</p>

Application

This unit describes the skills and knowledge required to perform cardiopulmonary resuscitation (CPR) in line with the Australian Resuscitation Council (ARC) Guidelines.

This unit applies to all workers who may be required to provide CPR, in a range of situations, including community and workplace settings.

Specific licensing /regulatory requirements relating to this competency, including requirements for refresher training should be obtained from the relevant national/state/territory Work Health and Safety Regulatory Authorities.

Elements and Performance Criteria

ELEMENT

Elements define the essential outcomes.

1. Respond to an emergency

PERFORMANCE CRITERIA

Performance criteria specify the level of performance needed to demonstrate achievement of the element.

1.1 Recognise an emergency situation

ELEMENT**PERFORMANCE CRITERIA**

Elements define the essential outcomes.

Performance criteria specify the level of performance needed to demonstrate achievement of the element.

situation

1.2 Identify, assess and minimise immediate hazards to health and safety of self and others

1.3 Assess the casualty and recognise the need for CPR

1.4 Seek assistance from emergency response services

2. Perform CPR procedures

2.1 Perform cardiopulmonary resuscitation in accordance with ARC guidelines

2.2 Display respectful behaviour towards casualty

2.3 Operate automated external defibrillator (AED) according to manufacturer's instructions

3. Communicate details of the incident

3.1 Accurately convey incident details to emergency response services

3.2 Report details of incident to workplace supervisor as appropriate

3.3 Maintain confidentiality of records and information in line with statutory and/or organisational policies

Foundation Skills

The Foundation Skills described those required skills (language, literacy, numeracy and employability skills) that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Unit Mapping Information

No equivalent unit.

Links

www.cshisc.com.au - <http://www.cshisc.com.au>

Assessment Requirements for HLTAID001 Provide cardiopulmonary resuscitation

Modification History

Release	Notes
Release 4	Updated mapping information. Changes to assessment requirements. Equivalent outcome.
Release 3	Updated mapping information. Equivalent outcome.
Release 2	Updated mapping information. Equivalent outcome.
Release 1	<p>This version was released in <i>HLT Health Training Package release 1.0</i> and meets the requirements of the New Standards for Training Packages.</p> <p>Significant changes to elements and performance criteria</p> <p>Revised evidence requirements, including volume and frequency of assessment</p>

Performance Evidence

The candidate must show evidence of the ability to complete tasks outlined in elements and performance criteria of this unit, manage tasks and manage contingencies in the context of the job role.

There must be evidence that the candidate has completed the following tasks in line with state/territory regulations, first aid codes of practice, Australian Resuscitation Council (ARC) guidelines and workplace procedures:

- Followed DRSABCD in line with ARC guidelines, including:
 - performed at least 2 minutes of uninterrupted single rescuer cardiopulmonary resuscitation (CPR) (5 cycles of both compressions and ventilations) on an adult resuscitation manikin placed on the floor
 - performed at least 2 minutes of uninterrupted single rescuer CPR (5 cycles both compressions and ventilations) on an infant resuscitation manikin placed on a firm surface
 - responded appropriately in the event of regurgitation or vomiting
 - managed the unconscious breathing casualty
 - followed single rescue procedure, including the demonstration of a rotation of operators with minimal interruptions to compressions

- followed the prompts of an automated external defibrillator (AED)
- Responded to at least one simulated first aid scenario contextualised to the candidate's workplace/community setting, including:
 - demonstrated safe manual handling techniques
 - provided an accurate verbal or written report of the incident

Knowledge Evidence

The candidate must be able to demonstrate essential knowledge required to effectively complete tasks outlined in elements and performance criteria of this unit, manage tasks and manage contingencies in the context of the work role. This includes knowledge of:

- State/Territory regulations, first aid codes of practice and workplace procedures including:
 - ARC Guidelines relevant to the provision of CPR
 - safe work practices to minimise risks and potential hazards
 - infection control principles and procedures, including use of standard precautions
 - requirements for currency of skill and knowledge
- Legal, workplace and community considerations, including:
 - awareness of potential need for stress-management techniques and available support following an emergency situation
 - duty of care requirements
 - respectful behaviour towards a casualty
 - own skills and limitations
 - consent
 - privacy and confidentiality requirements
 - importance of debriefing
- Considerations when providing CPR, including:
 - airway obstruction due to body position
 - appropriate duration and cessation of CPR
 - appropriate use of an AED
 - chain of survival
 - standard precautions
- Basic anatomy and physiology relating to:
 - how to recognise a person is not breathing normally
 - chest
 - response/consciousness
 - upper airway and effect of positional change

Assessment Conditions

Skills must be demonstrated working individually in an environment that provides realistic in-depth, industry-validated scenarios and simulations to assess candidates' skills and knowledge.

Assessment resources must include:

- adult and infant resuscitation manikins in line with ARC Guidelines for the purpose of assessment of CPR procedures
- AED training device
- workplace injury, trauma and/or illness record, or other appropriate workplace incident report form

Simulated assessment environments must simulate the real-life working environment where these skills and knowledge would be performed, with all the relevant equipment and resources of that working environment.

Assessor Requirements

Assessors must satisfy the NVR/AQTF mandatory competency requirements for assessors.

In addition hold current first aid certificate HLTAID003 or higher.

Links

Companion volumes from the CS&HISC website - <http://www.cshisc.com.au>

HLTAID003 Provide first aid

Modification History

Release	Comments
Release 5	Updated mapping information. Changes to assessment requirements. Equivalent outcome.
Release 4	Updated mapping information. Equivalent outcome.
Release 3	Updated mapping information.
Release 2	Minor corrections to formatting to improve readability. Equivalent competency outcome.
Release 1	<p>This version was released in <i>HLT Health Training Package release 1.0</i> and meets the requirements of the New Standards for Training Packages.</p> <p>Significant changes to elements and performance criteria, changes to scope of unit. New evidence requirements for assessment. Removal of prerequisite unit</p>

Application

This unit describes the skills and knowledge required to provide a first aid response to a casualty. The unit applies to all workers who may be required to provide a first aid response in a range of situations, including community and workplace settings.

Specific licensing /regulatory requirements relating to this competency, including requirements for refresher training should be obtained from the relevant national/state/territory Work Health and Safety Regulatory Authorities.

Elements and Performance Criteria

ELEMENT

Elements define the essential outcomes.

1. Respond to an emergency situation

PERFORMANCE CRITERIA

Performance criteria specify the level of performance needed to demonstrate achievement of the element.

1.1 Recognise an emergency situation
1.2 Identify, assess and manage immediate hazards to

ELEMENT**PERFORMANCE CRITERIA**

Elements define the essential outcomes.

Performance criteria specify the level of performance needed to demonstrate achievement of the element.

health and safety of self and others

1.3 Assess the casualty and recognise the need for first aid response

1.4 Assess the situation and seek assistance from emergency response services

2. Apply appropriate first aid procedures

2.1 Perform cardiopulmonary resuscitation (CPR) in accordance with Australian Resuscitation Council (ARC) guidelines

2.2 Provide first aid in accordance with established first aid principles

2.3 Display respectful behaviour towards casualty

2.4 Obtain consent from casualty where possible

2.5 Use available resources and equipment to make the casualty as comfortable as possible

2.6 Operate first aid equipment according to manufacturer's instructions

2.7 Monitor the casualty's condition and respond in accordance with first aid principles

3. Communicate details of the incident

3.1 Accurately convey incident details to emergency response services

3.2 Report details of incident to workplace supervisor as appropriate

3.3 Maintain confidentiality of records and information in line with statutory and/or organisational policies

4. Evaluate the incident and own performance

4.1 Recognise the possible psychological impacts on self and other rescuers involved in critical incidents

4.2 Participate in debriefing to address individual needs

Foundation Skills

The Foundation Skills described those required skills (such as language, literacy, numeracy and employment skills) that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Unit Mapping Information

No equivalent unit.

Links

www.cshisc.com.au - <http://www.cshisc.com.au>

Assessment Requirements for HLTAID003 Provide first aid

Modification History

Release	Comments
Release 5	Updated mapping information. Changes to assessment requirements. Equivalent outcome.
Release 4	Updated mapping information. Equivalent outcome.
Release 3	Updated mapping information.
Release 2	Minor corrections to formatting to improve readability. Equivalent competency outcome.
Release 1	<p>This version was released in <i>HLT Health Training Package release 1.0</i> and meets the requirements of the New Standards for Training Packages.</p> <p>Significant changes to elements and performance criteria, changes to scope of unit. New evidence requirements for assessment. Removal of prerequisite unit</p>

Performance Evidence

The candidate must show evidence of the ability to complete tasks outlined in elements and performance criteria of this unit, manage tasks and manage contingencies in the context of the job role.

There must be evidence that the candidate has completed the following tasks in line with state/territory regulations, first aid codes of practice, Australian Resuscitation Council (ARC) guidelines and workplace procedures:

- Followed DRSABCD in line with ARC guidelines, including:
 - performed at least 2 minutes of uninterrupted single rescuer cardiopulmonary resuscitation (CPR) (5 cycles of both compressions and ventilations) on an adult resuscitation manikin placed on the floor
 - performed at least 2 minutes of uninterrupted single rescuer CPR (5 cycles both compressions and ventilations) on an infant resuscitation manikin placed on a firm surface
 - responded appropriately in the event of regurgitation or vomiting
 - managed the unconscious breathing casualty
 - followed single rescue procedure, including the demonstration of a rotation of operators with minimal interruptions to compressions
 - followed the prompts of an Automated External Defibrillator (AED)
- Responded to at least two simulated first aid scenarios contextualised to the candidate's workplace/community setting, including:
 - conducted a visual and verbal assessment of the casualty
 - demonstrated safe manual handling techniques
 - post-incident debrief and evaluation
 - provided an accurate verbal or written report of the incident
- Applied first aid procedures for the following:
 - allergic reaction
 - anaphylaxis
 - bleeding control
 - choking and airway obstruction
 - envenomation, using pressure immobilisation
 - fractures, sprains and strains, using arm slings, roller bandages or other appropriate immobilisation techniques
 - respiratory distress, including asthma
 - shock

Knowledge Evidence

The candidate must be able to demonstrate essential knowledge required to effectively complete tasks outlined in elements and performance criteria of this unit, manage tasks and manage contingencies in the context of the work role. This includes knowledge of:

- State/Territory regulations, first aid codes of practice and workplace procedures including:
 - ARC Guidelines relevant to provision of CPR and first aid
 - safe work practices to minimise risks and potential hazards
 - infection control principles and procedures, including use of standard precautions
 - requirements for currency of skill and knowledge
- legal, workplace and community considerations including:
 - awareness of potential need for stress-management techniques and available support following an emergency situation
 - duty of care requirements
 - respectful behaviour towards a casualty
 - own skills and limitations
 - consent
 - privacy and confidentiality requirements
 - importance of debriefing
- considerations when providing first aid including:
 - airway obstruction due to body position
 - appropriate duration and cessation of CPR
 - appropriate use of an AED
 - chain of survival
 - standard precautions
 - how to conduct a visual and verbal assessment of the casualty
- principles and procedures for first aid management of the following scenarios:
 - abdominal injuries
 - allergic reaction
 - anaphylaxis
 - basic care of a wound
 - bleeding control
 - burns
 - cardiac conditions, including chest pain
 - choking and airway obstruction
 - crush injuries
 - diabetes
 - dislocations
 - drowning
 - envenomation
 - environmental impact, including hypothermia, hyperthermia, dehydration and heat stroke
 - eye and ear injuries
 - fractures
 - febrile convulsions
 - head, neck and spinal injuries

- minor skin injuries
- needle stick injuries
- poisoning and toxic substances
- respiratory distress, including asthma
- seizures, including epilepsy
- shock
- soft tissue injuries, including strains and, sprains
- stroke
- unconsciousness
- basic anatomy and physiology relating to:
 - how to recognise a person is not breathing normally
 - chest
 - response/consciousness
 - upper airway and effect of positional change
 - considerations in provision of first aid for specified conditions

Assessment Conditions

Skills must be demonstrated working individually in an environment that provides realistic in-depth, industry-validated scenarios and simulations to assess candidates' skills and knowledge.

Assessment resources must include:

- adult and infant resuscitation manikins in line with ARC Guidelines for the purpose of assessment of CPR procedures
- adrenaline auto-injector training device
- AED training device
- placebo bronchodilator and spacer device
- roller bandages
- triangular bandages
- workplace First Aid kit
- workplace injury, trauma and/or illness record, or other appropriate workplace incident report form for written reports
- wound dressings

Simulated assessment environments must simulate the real-life working environment where these skills and knowledge would be performed, with all the relevant equipment and resources of that working environment.

Assessor requirements

Assessors must satisfy the NVR/AQTF mandatory competency requirements for assessors.

Links

Companion volumes from the CS&HISC website - <http://www.cshisc.com.au>

ICTCBL2065A Splice and terminate optical fibre cable for carriers and service providers

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	<p>This unit describes the performance outcomes, skills and knowledge required to splice and terminate optical fibre cable within an optical telecommunications transmission environment.</p> <p>This work is essential in provisioning of National Broadband Network (NBN) infrastructure for high speed and high bandwidth transmissions.</p> <p>Assessment by a TITAB registered assessor is recommended.</p> <p>All customer cabling work in the telecommunications, fire, security and data industries must be performed by a registered cabler. All cablers are required to register with an Australian Communications and Media Authority (ACMA)-accredited registrar.</p>
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Application of the Unit

Application of the unit	<p>Technical staff who splice and terminate optical fibre cable for telecommunications projects apply the skills and knowledge in this unit.</p> <p>They may carry out new installations, upgrade an optical backbone or access network provisioning for greater bandwidth and capacity required by emerging technology convergence for Next Generation Networks (NGN).</p> <p>This unit may be applied to commercial or industrial fibre to the premises (FTTP) installations.</p>
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for splicing	1.1. Select safety equipment to protect self and public according to enterprise guidelines and occupational health and safety (<i>OHS practices</i>) 1.2. Confirm layout of job using installation according to <i>physical conditions</i> at site and <i>relevant legislation, codes, regulations and standards</i> 1.3. Inform appropriate personnel of identified <i>hazards</i> on worksite 1.4. Locate other services from <i>relevant authorities</i> according to enterprise guidelines and safe practices 1.5. Test for <i>dangerous gases</i> and place <i>guards</i> around open manholes following <i>OHS and environmental requirements</i> 1.6. Obtain approval for alterations to the design according to enterprise guidelines
2. Check existing optical fibre cable	2.1. Verify that cable was installed according to the installation plan and visually inspect <i>cable</i> for signs of sheath damage 2.2. Maintain minimum bend ratios according to manufacturer's specifications to prevent cable damage and signal degradation 2.3. Secure cable according to safe industry practice to avoid cable and sheath damage
3. Splice optical fibre cable	3.1. Verify fibre is not live using <i>appropriate equipment</i> to maintain safe working practice and ensure correct fibre has been identified 3.2. Prepare cable end to expose <i>optical fibres</i> according to splicing method and manufacturer's specifications 3.3. Prepare and <i>splice fibres</i> using safe industry practice according to enterprise specifications 3.4. Test the splice joint to manufacturer's and design requirements
4. Terminate optical fibre cable	4.1. Select connector unit to suit terminating frame according to design specifications 4.2. Terminate the cable using the <i>type of termination</i> specified in the plan and according to manufacturer's specifications 4.3. Test the termination for transmission loss and strength and re-terminate if the transmission loss exceeds the manufacturer's specifications

ELEMENT	PERFORMANCE CRITERIA
	4.4. Install protection devices on connectors and fibres to protect from exposure and contaminants 4.5. Label and lay up cables in enclosure according to manufacturer's instructions and enterprise guidelines
5. Finish job and report	5.1. Remove waste and reinstate site according to enterprise guidelines 5.2. Prepare reports including test results and alterations to plans according to enterprise policy 5.3. Notify client of work completion and obtain sign off

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication skills to:
 - liaise with internal and external personnel on technical and operational matters
 - relate to work associates, supervisors, team members and clients
- literacy skills to interpret technical documentation such as equipment manuals, specifications and requirements for optical fibre cable installation
- numeracy skills to take and analyse measurements
- planning and organisational skills to organise and maintain equipment
- problem solving skills to solve equipment and logistics problems
- safety awareness skills to:
 - apply precautions and required action to minimise, control or eliminate hazards that may exist during work activities
 - apply work site OHS
 - select and use required personal protective equipment conforming to industry and OHS standards
 - work safely with optical fibre and lasers
 - work systematically with required attention to detail without injury to self or others, or damage to goods or equipment
- technical skills to:
 - install customer access network (CAN) cable
 - operate test equipment to perform measurements on optical fibre
 - perform fault clearance

REQUIRED SKILLS AND KNOWLEDGE

- use diagnostic equipment
- use optical fibre jointing techniques
- use specialised tools and test equipment
- use hand and power tools

Required knowledge

- causes of signal strength loss in optical fibre
- colour coding of fibres
- detailed knowledge of AS/NZS 2211:2006 Safety of laser products (parts 1 and 2)
- features and operating requirements of test equipment for optical fibre cable
- industry and organisational policy and procedures when splicing optical fibre cable
- information required to operate equipment according to a test specification
- manufacturer's requirements for safe operation of optical fibre equipment
- safety precautions when working with laser based systems
- specific OHS requirements relating to the activity and site conditions
- techniques for types of termination including:
 - direct termination
 - fusion splicing
 - mechanical splicing
- test methods and performance requirements
- types of optical cable and termination
- workplace and industry environment

Evidence Guide

EVIDENCE GUIDE	
<p>The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the ability to:</p> <ul style="list-style-type: none"> • splice, terminate and test optical fibre cable applying safety precautions when working with laser -based systems • splice at least 12 fibres and house these in splicing cassettes and trays within industry recognised enclosures according to manufacturer's instructions • install a connector type for fusion, mechanical splicing and direct terminations • complete relevant documentation to manufacturer's and design requirements • provide report documenting the installation and test results to client • comply with all related OHS requirements and work practices.
Context of and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> • sites where splicing and termination of optical fibre cable may be conducted • use of optical fibre testing equipment currently used in industry • relevant regulatory and equipment documentation that impact on optical fibre cable installation activities.
Method of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> • review of a hands-on project completed by the candidate • review of an oral and written report, including installation and test results • direct observation of the candidate carrying out splicing of optical fibre within an optical communication system.
Guidance information for	Holistic assessment with other units relevant to the

EVIDENCE GUIDE	
assessment	<p>industry sector, workplace and job role is recommended, for example:</p> <ul style="list-style-type: none"> • ICTCBL3010A Install and terminate optical fibre cable on customer premises. <p>Aboriginal people and other people from a non-English speaking background may have second language issues.</p> <p>Access must be provided to appropriate learning and assessment support when required.</p> <p>Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.</p> <p>In all cases where practical assessment is used it will be combined with targeted questioning to assess required knowledge. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency.</p> <p>Where applicable, physical resources should include equipment modified for people with special needs.</p>

Range Statement

RANGE STATEMENT	
<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
<i>OHS practices</i> may relate to:	<ul style="list-style-type: none"> • determining that optical fibre cable is not live according to guidelines and standards

RANGE STATEMENT	
	<ul style="list-style-type: none"> • handling optical fibre cable in a safe manner to avoid risk of injury • labelling of fibre cable and laser devices • locating and identifying adjoining services according to enterprise guidelines and OHS practices • observing AS/NZS 2211:2006 Safety of laser products (parts 1 and 2) • testing for presence of dangerous gases according to enterprise guidelines.
Physical conditions may relate to:	<ul style="list-style-type: none"> • above ground • in cabinet • in joint enclosure.
Relevant legislation, codes, regulations and standards may include:	<ul style="list-style-type: none"> • Australian Communications Industry Forum (ACIF) standards and codes • AS Communications Cabling Manual (CCM) Volume 1 • AS/NZS 2211:2006 Safety of laser products (parts 1 and 2) • AS/NZS 3000:2007 • AS/NZS 3080:2003 • AS/NZS 3084:2003 • AS/NZS 3085.1:2004 • AS/NZS ISO/IEC 14763.3:2007 • AS/NZS ISO/IEC 15018:2005 • AS/NZS ISO/IEC 24702:2007 • cabling security codes and regulations • OHS • regulated or industry codes of practice including ACMA technical standards • technical standards AS/ACIF S008:2006 and AS/ACIF S009:2006.
Hazards may include:	<ul style="list-style-type: none"> • earth potential rise (EPR) • optical cable: <ul style="list-style-type: none"> • bare fibres • hazardous laser light • remote power feeding.
Relevant authorities may include:	<ul style="list-style-type: none"> • cable location services (Dial Before you Dig) • environment protection • local government • private owners

RANGE STATEMENT	
	<ul style="list-style-type: none"> • utility providers such as: <ul style="list-style-type: none"> • electricity • fire services • gas • other telecommunications providers • water.
<i>Dangerous gases</i> may include:	<ul style="list-style-type: none"> • asphyxiating gas • carbon dioxide • carbon monoxide • combustible • natural gas • noxious gas.
<i>Guards</i> may include:	<ul style="list-style-type: none"> • barricades • plates • temporary fencing.
<i>OHS and environmental requirements</i> may relate to:	<ul style="list-style-type: none"> • identifying other services, including power and gas • need to decommission and isolate worksite and lines prior to commencement • personal protective clothing: <ul style="list-style-type: none"> • earmuffs • gloves: <ul style="list-style-type: none"> • leather • plastic • rubber • head protection • kneepads • masks • protective suits • safety boots • safety glasses • safe working practices, such as the safe use and handling of: <ul style="list-style-type: none"> • asbestos • chemicals • materials • tools and equipment • work platforms • safety equipment:

RANGE STATEMENT	
	<ul style="list-style-type: none"> • flashing lights • gas and other hazard detection equipment • safety barriers • trench guards • warning signs and tapes • witches hats • suitable light and ventilation • special access requirements • environmental considerations: <ul style="list-style-type: none"> • clean-up protection • stormwater protection • waste management.
<i>Cable</i> may include:	<ul style="list-style-type: none"> • air blown • armoured • external • internal • loose tube • tight buffered.
<i>Appropriate equipment</i> may include:	<ul style="list-style-type: none"> • hand-held optical power meter • OFI-fibre to the x (FTTx) active optical network terminal (ONT) detector • passive optical network (PON) meter • optical time domain reflectometer (OTDR).
<i>Optical fibres</i> may include:	<ul style="list-style-type: none"> • multi-mode • polymer • single mode.
<i>Splice fibres</i> may relate to:	<ul style="list-style-type: none"> • fusion splice • mechanical splice • preparing connection ends to a smooth flat surface to ensure no optical path redirection from joint • removing all coatings from exposed optical fibre and removing all possible contaminants.
<i>Type of termination</i> may include:	<ul style="list-style-type: none"> • direct termination • fusion splicing • mechanical splicing.

Unit Sector(s)

Unit sector	Telecommunications
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Co-requisite units

Co-requisite units		

Competency field

Competency field	Cabling
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ICTCBL2068A Install a telecommunications service to a building

Modification History

Not Applicable

Unit Descriptor

<p>Unit descriptor</p>	<p>This unit describes the performance outcomes, skills and knowledge required to install a telecommunications service to a building. It involves bringing a telecommunications service from the broader network to a customer's premises using metallic or optical cable or wireless connection.</p> <p>Licensing, legislative, regulatory and certification requirements apply to working at heights. If an elevated work platform (EWP) is required, verify state or territory law requirements for a licence to operate an EWP. Users should confirm requirements with the relevant federal, state or territory authority.</p> <p>If working at heights, achievement of the unit 'CPCPCM2015A Work safely on roofs' from the CPC08 Construction and Plumbing Services Integrated framework training Package fulfils this requirement.</p>
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Application of the Unit

<p>Application of the unit</p>	<p>Technical staff whose work involves installing telecommunications service to a building to provide a new service or an upgrade apply the skills and knowledge in this unit.</p> <p>Cable installers provide new services in emerging technologies, such as internet protocol TV (IPTV) and fast broadband for converging technology applications.</p> <p>A wireless access point or a world interoperability for microwave access (WiMAX) customer premises equipment (CPE) unit could also be an installation to the building to provide the new services.</p>
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare service installation	1.1. Arrange access to the site with the <i>customer</i> and obtain job specifications 1.2. Notify supervisor of identified <i>safety hazards</i> at the worksite according to occupational health and safety (<i>OHS</i>) and <i>environmental requirements</i> 1.3. Use <i>installation specifications</i> to determine type of services, network cables and equipment required for the installation 1.4. Select cables and equipment that comply with functionality and compatibility of existing installation 1.5. Select and obtain <i>tools and equipment</i> to carry out installation activity
2. Install cable and equipment to building	2.1. Locate, connect, and check cables at entry into network for transmission quality and continuity where service to building exists 2.2. Install cable and equipment and seal cable entry to the building in a safe manner according to installation plans and Australian Communications and Media Authority (ACMA) standards 2.3. Test overall functionality of the new service to meet installation specifications 2.4. Rectify faults if required and minimise interruption to existing service in agreement with customer 2.5. Install <i>lightning protection</i> , where required, according to enterprise guidelines and industry practice
3. Complete records and clean up site	3.1. Label cable pairs clearly to provide an accurate identification according to manufacturer's, industry and client standards 3.2. Update records and plans with <i>installation details</i> to provide an accurate record according to industry codes of practice and AS/ACIF S009:2006 3.3. Remove installation waste and debris from worksite and dispose of according to environmental requirements to maintain safe worksite conditions 3.4. Complete telecommunications cabling advice (TCA) forms and notify customer to obtain sign off

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication skills to liaise with internal and external personnel on technical and operational matters
- literacy skills to interpret technical documentation such as equipment manuals and specifications
- numeracy skills to take and analyse measurements
- planning and organisational skills to organise and maintain equipment
- problem solving skills to solve equipment and logistics problems
- safety awareness skills to:
 - apply precautions and required action to minimise, control or eliminate hazards that may exist during work activities
 - select and use required personal protective equipment conforming to industry and OHS standards
 - work systematically with required attention to detail without injury to self or others, or damage to goods or equipment
- technical skills to:
 - perform fault clearance
 - read and interpret:
 - building plans
 - construction plans
 - site layout drawings
 - site plans
 - street plans
 - use diagnostic equipment
 - use hand and power tools

Required knowledge

- information required to operate equipment according to a test specification
- features and operating requirements of test equipment
- legislation, codes of practice and other formal agreements that impact on the work activity
- manufacturer's requirements for safe operation of equipment
- OHS requirements and work practices associated with cable provision including:
 - adequate warning signs
 - protective clothing and personal safety items
 - safety devices

REQUIRED SKILLS AND KNOWLEDGE

- | |
|--|
| <ul style="list-style-type: none">• test methods and performance requirements• typical issues and challenges that occur on site |
|--|

Evidence Guide

EVIDENCE GUIDE	
<p>The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Evidence of the ability to:</p> <ul style="list-style-type: none"> • prepare and install cable and equipment to a building complying with ACMA, enterprise and government regulations • conduct tests related to transmission quality and continuity of cables at network entry point • label and document installation work complying with industry codes of practice • comply with all related OHS requirements and work practices.
Context of, and specific resources for assessment	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> • sites where telecommunications services may be installed • use of installation and testing equipment currently used in industry • relevant regulatory and equipment documentation that impact on installation activities.
Methods of assessment	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> • review of an installation completed by the candidate • review of an oral and written report with completed documentation, including updated installation records and forms • direct observation of the candidate installing telecommunications equipment to a building • oral or written questioning to assess required knowledge .
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p> <ul style="list-style-type: none"> • ICTCBL2134A Fix aerial cable.

EVIDENCE GUIDE

	<p>Aboriginal people and other people from a non-English speaking background may have second language issues.</p> <p>Access must be provided to appropriate learning and assessment support when required.</p> <p>Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed.</p> <p>In all cases where practical assessment is used it will be combined with targeted questioning to assess required knowledge. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency.</p> <p>Where applicable, physical resources should include equipment modified for people with special needs.</p>
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Range Statement**RANGE STATEMENT**

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

<i>Customer</i> may include:	<ul style="list-style-type: none"> • nominated representative • project manager • site manager.
<i>Safety hazards</i> may refer to:	<ul style="list-style-type: none"> • access points that may contain: <ul style="list-style-type: none"> • hazardous light or non-visible laser • radio frequency (RF) emission

RANGE STATEMENT	
	<ul style="list-style-type: none"> • electrical supply and areas of earth potential rise (EPR) that require mandatory separation from communications cable • hazardous conduit as in conduit colours according to AS 1345:1995 associated with a hazardous service.
<i>OHS and environmental requirements</i> may relate to:	<ul style="list-style-type: none"> • identifying other services, including power and gas • need for decommissioning and isolating worksite and lines prior to commencement • personal protective clothing: <ul style="list-style-type: none"> • earmuffs • gloves: <ul style="list-style-type: none"> • leather • plastic • rubber • head protection • kneepads • masks • protective suits • safety boots • safety glasses • safety harness • safety line • safe working practices, such as the safe use and handling of: <ul style="list-style-type: none"> • asbestos • chemicals • materials • tools and equipment • work platforms • safety equipment: <ul style="list-style-type: none"> • flashing lights • gas and other hazard detection equipment • safety barriers • trench guards • warning signs and tapes • witches hats • special access requirements

RANGE STATEMENT	
	<ul style="list-style-type: none"> • suitable light and ventilation • environmental considerations: <ul style="list-style-type: none"> • clean-up protection • stormwater protection • waste management.
<i>Installation specifications</i> may include:	<ul style="list-style-type: none"> • installation plan • project details: <ul style="list-style-type: none"> • contact personnel • costs • resource requirements • timelines • type of service • type of service: <ul style="list-style-type: none"> • aerial or underground structure • cable: <ul style="list-style-type: none"> • coaxial • multi-pair • optical fibre • structured (Category 5, 6, 6A, 7 or 7A) • wireless: <ul style="list-style-type: none"> • femtocell • wireless fidelity (WiFi) • WiMAX.
<i>Tools and equipment</i> may include:	<ul style="list-style-type: none"> • equipment: <ul style="list-style-type: none"> • cable testers • network tester • passive optical meter • RF meter • tools: <ul style="list-style-type: none"> • crimpers • jointers • labellers • power tools: <ul style="list-style-type: none"> • cutters • drills • splicers • terminating tool • EWPs and ladders.

RANGE STATEMENT	
<i>Lightning protection</i> may include:	<ul style="list-style-type: none"> • arrester • bonding building and cable to power earthing system • building's own protection • earth stake • isolator.
<i>Installation details</i> may include:	<ul style="list-style-type: none"> • cable infrastructure pair locations • cable location and type • equipment details • interconnections • modified plan • pair numbering and labelling • test results.

Unit Sector(s)

Unit sector	Telecommunications
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Co-requisite units

Co-requisite units	

Competency field

Competency field	Cabling
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MEM16012A Interpret technical specifications and manuals

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers identifying, accessing, interpreting and analysing technical information in an enterprise, including quality documentation, equipment manufacturer specifications, engineering data sheets and national standards. It also covers explaining and using the information, and identifying implications of changes to technical information.
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Application of the Unit

Application of the unit	<p>This unit goes beyond routine accessing and interpretation of technical information. This unit applies to the identification, access, interpretation and analysis of technical information to enable carrying out engineering or manufacturing activities.</p> <p>For routine accessing, organising and communication of information related to processes or tasks, MEM16006A Organise and communicate information should be regarded as sufficient.</p> <p>Band: B</p> <p>Unit Weight: 4</p>
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units	

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Identify and locate technical information resources	1.1. Information needs are identified and confirmed with appropriate persons. 1.2. Workplace information resources are identified and their location is determined in the information system. 1.3. Appropriate technical information is obtained.
2. Access technical information	2.1. Relevant technical information is located using search techniques appropriate to the resource and information requirements. 2.2. Symbols, codes, legends, and abbreviations are interpreted correctly. 2.3. Technical information is accessed and relevant application is understood. 2.4. Clarification or further explanation of technical information is obtained, where required. 2.5. If applicable, the revision status of the technical information is verified to ensure current status.
3. Interpret and analyse technical information	3.1. Technical information/data appropriate to work requirements and/or application is checked for currency and authenticity. 3.2. Technical information is interpreted and analysed for use in given engineering or manufacturing applications. 3.3. Technical information is used according to the specific engineering or manufacturing application.
4. Explain and use information	4.1. Information and analyses is explained and distributed to appropriate personnel. 4.2. Information resources are used according to work requirements. 4.3. Where applicable, work is undertaken in accordance with acquired technical information.
5. Identify implications of changes to technical information	5.1. Technical information systems are monitored for changes. 5.2. Personnel affected by changes to internal or external specifications or other technical information are identified. 5.3. Means of distributing changed information are established. 5.4. Changes to technical information are documented

ELEMENT	PERFORMANCE CRITERIA
	according to enterprise procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Look for evidence that confirms skills in:

- accessing, reading and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents
- planning, sequencing operations
- following oral/written instructions
- checking and clarifying task-related information
- checking for conformance to specifications
- undertaking numerical operations and calculations/formulae within the scope of this unit
- entering information onto workplace documents
- accessing and using technical documentation
- identifying and using correct specifications for process and/or systems
- using components of system, where appropriate
- completing formal documentation and reporting as required
- adopting appropriate communication strategy, including confirmation of received information and distribution of instructions
- communicating information in ways appropriate for the audience
- maintaining appropriate records
- identifying and analysing implications of changes to information systems

Required knowledge

Look for evidence that confirms knowledge of:

- available industry information resources
- uses and applications of information resources
- range of formats that information can be presented
- safe work practices and procedures
- location and retrieval requirements of system information
- correct process used to identify relevant specifications

REQUIRED SKILLS AND KNOWLEDGE

- quality improvement processes for information systems
- interpretation of technical data and information
- appropriate communication strategies
- dissemination of information regarding information systems
- a range of instructional techniques
- implications of changes to technical information
- procedures for responding to information changes
- hazards and control measures associated with changes to technical information, including housekeeping
- safe workplace practices and procedures

Evidence Guide

EVIDENCE GUIDE	
<p>The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	<p>A person who demonstrates competency in this unit must be able to interpret and analyse information from specifications and manuals.</p>
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.</p>
Context of and specific resources for assessment	<p>This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.</p> <p>This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with interpreting and analysing information from specifications and manuals or other units requiring the exercise of the skills and knowledge covered by this unit.</p>
Method of assessment	<p>Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.</p>
Guidance information for	

EVIDENCE GUIDE	
assessment	

Range Statement

RANGE STATEMENT	
<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
Information resources	Documented management system (manufacturing, quality, environmental, occupational health and safety), manufacturers' manuals, specifications, Australian and international standards, customer requirements, industry manuals, codes of practice, legislation etc. in hard and soft copy
Location	Reference libraries, workplace storage areas, internet, site
Information system	Internal and/or external. The system would typically have documentation tiers
Technical information	Technical information and data suitable and appropriate for advanced trade and technician applications within the enterprise. This unit does not cover documentation written for professional engineering or scientist applications
Search techniques	<ul style="list-style-type: none"> • Computer database and internet search/look-up • Standard techniques to identify relevant information including skimming and scanning, identifying key words/ideas, using index, table of contents, numbering and classification systems etc.
Analyses	Conclusions made from the analysis of technical information

Unit Sector(s)

Unit sector	
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Co-requisite units

Co-requisite units		

Competency field

Competency field	Communication
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MEM17003A Assist in the provision of on the job training

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers assisting in the provision of on the job training to others while undertaking normal duties.
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Application of the Unit

Application of the unit	<p>This unit may involve the replacement of normal duties with training duties for limited periods of time. The individual would not be expected to be solely responsible for the assessment or reporting of a trainee's progress.</p> <p>Typical applications could include the provision of on the job guidance by a tradesperson to apprentices/trainees or by a production worker to other production workers/trainees.</p> <p>Where development of training programs is involved see Unit MEM17001B (Assist in development and deliver training in the workplace).</p> <p>Band: A</p> <p>Unit Weight: 2</p>
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units	

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Determine role of on the job training	1.1.Objectives of training and role of on the job training are identified in consultation with team leaders or other appropriate personnel.
2. Provide on the job training	2.1.Training is conducted using learning methods appropriate to the training objectives and learner. 2.2.Trainee progress is monitored and feedback is provided appropriate to the learning outcomes.
3. Report on trainee performance	3.1.Trainee's progress is reported according to standard operating procedure.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Look for evidence that confirms skills in:

- obtaining all relevant information with respect to the training to be provided
- applying suitable training methods
- providing feedback to the trainee throughout the training process
- reporting on the trainee's progress
- reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents
- planning and sequencing operations
- checking and clarifying task-related information

Required knowledge

Look for evidence that confirms knowledge of:

- training to be delivered
- personnel to be consulted with respect to the training to be provided
- the individual's role in the provision of training
- objectives of the training
- the person(s) to be trained
- procedures to be followed when training individuals

REQUIRED SKILLS AND KNOWLEDGE

- training location(s)
- tools, equipment, procedures, materials and resources
- training delivery methods, their applications, advantages and disadvantages
- feedback techniques
- reasons for monitoring trainee progress
- reporting procedures
- hazards and control measures associated with assisting in the provision of on the job training, including housekeeping
- safe work practices and procedures

Evidence Guide

EVIDENCE GUIDE	
<p>The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	A person who demonstrates competency in this unit must be able to assist in the provision of on the job training.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.
Context of and specific resources for assessment	<p>This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.</p> <p>This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with assisting in the provision of on the job training or other units requiring the exercise of the skills and knowledge covered by this unit.</p>
Method of assessment	Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
Guidance information for assessment	

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Learning methods	Explanation, demonstration, simulation
Report	Should include information about the skills satisfactorily achieved and those where further practice is required

Unit Sector(s)

Unit sector	
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Co-requisite units

Co-requisite units	

Competency field

Competency field	Training
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NWP218B Perform and record sampling

Modification History

NWP218B Release 2: Layout adjusted. No changes to content.
NWP218B Release 1: Primary release.

Unit Descriptor

This unit of competency describes the outcomes required to collect and prepare water and wastewater samples according to legislative and organisational standard operating procedures.

Application of the Unit

This unit supports the attainment of skills and knowledge required for field and operational staff with specific responsibility for collecting grab or composite water samples.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency. Performance criteria describe the required performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for water quality sampling.	<p>1.1 Confirm required <i>samples</i>, procedures for sampling and sampling locations according to <i>organisational requirements</i>.</p> <p>1.2 Select <i>sampling equipment</i> according to specified samples required and appropriate <i>sample preservation methods</i>.</p> <p>1.3 Identify, check and prepare materials, equipment and resources required to satisfy job plan according to organisational requirements.</p> <p>1.4 <i>Plan sampling work activities</i> to comply with sampling plan and organisational requirements.</p>
2 Conduct water quality sampling.	<p>2.1 Collect samples ensuring that sample types, <i>sampling locations</i> and sampling times comply with sampling plan.</p> <p>2.2 Maintain integrity of samples during sampling and label sample containers according to organisational requirements.</p> <p>2.3 Follow approved safety procedures to limit hazards and contamination to self, work area and environment.</p>
3 Record sampling data.	<p>3.1 <i>Record</i> required information according to legislative and organisational requirements.</p> <p>3.2 Report observations or measurements outside organisational guidelines or specifications for further action.</p>

Required Skills and Knowledge

This describes the essential skills and knowledge and their level, required for this unit.

Required skills:

- prepare, collect, label and preserve water samples
- dispose of waste and spent samples correctly
- produce reports and logs
- plan work activities
- work effectively as part of a team
- perform task-related calculations
- identify and obtain resources
- follow plans and instructions
- apply procedures and standards
- communicate work requirements
- use literacy skills in regard to verbal and written communication in the workplace
- use personal protective equipment

Required knowledge:

- types and purposes of water samples
- procedures and techniques for water sampling
- water sample preparation, including:
 - prevention of contamination
 - volume of sample
 - appropriate containers
 - preservation
 - location selection
 - location maintenance
 - equipment
 - transportation
 - documentation procedures for water samples
 - disposal procedures for waste and excess water samples
- task-related calculations
- legislative and organisational policies, procedures and standards
- communication systems
- work planning processes
- effects of weather and conditions on work
- hazards associated with collection of water samples

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

The candidate should demonstrate the ability to perform basic water sampling by:

- planning and preparing for water sampling tasks
- collecting samples according to sampling plan
- maintaining integrity of water samples
- recording all required information

Context of and specific resources for assessment

Access to the workplace and resources including:

- documentation that should normally be available in a water industry organisation
- relevant codes, standards and government regulations

Where applicable, physical resources should include equipment modified for people with disabilities.

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the language and literacy capacity of the candidate and the work being performed.

Validity and sufficiency of evidence requires that:

- competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace
- where the assessment is part of a structured learning experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice
- a decision of competence should only be made when the assessor has complete confidence in the person's competence over time and in various contexts
- all assessment that is part of a structured learning experience must include a combination of direct, indirect and supplementary evidence
- where assessment is for the purpose of recognition (RCC/RPL), the evidence provided will need to be authenticated and show that it represents competency demonstrated over a period of time
- assessment can be through simulated project-based activity and must include evidence relating to each of the

elements in this unit

In all cases where practical assessment is used it will be combined with targeted questioning to assess the underpinning knowledge. Questioning will be undertaken in a manner appropriate to the skill levels of the operator and cultural issues that may affect responses to the questions, and will reflect the requirements of the competency and the work being performed.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

- Samples*** may include:
- grab, composite or flow-weighted composite samples for:
 - microbiological testing
 - testing for chemical and physical characteristics
- Organisational requirements*** may include:
- standard operating procedures
 - Australian standards, for example AS/NZS 5667 Water quality - sampling
 - state Environment Protection Authority sampling guidelines
 - legislative requirements
 - OHS
- Sampling equipment*** may include:
- buckets or wide-mouthed containers
 - depth samplers
 - sample dippers
 - sterile sample containers:
 - plastic
 - glass
 - test-specific, such as acid washed
 - weighted sample bottles
 - dip tubes
 - composite and discrete automatic samplers
- Sample preservation methods*** may include:
- refrigeration
 - freezing
 - chemical addition, such as acidification
 - shielding from direct sunlight
 - filtration
- Planning sampling work activities*** may include:
- interpretation of instructions and directions
 - timelines
 - interaction and communication with team members and individuals
 - customer service requirements
- Sampling locations*** may include:
- raw water supply, including:
 - surface water
 - groundwater
 - water distribution and treatment systems
 - wastewater collection and treatment systems

Records may include:

- sample records, field detail sheets or chain of custody forms, including information such as:
 - time sample was taken
 - details of person collecting sample
 - sample point
 - volume of sample
- data gathered at time of collection
- pre-treatment
- preservation
- instructions to transporters

Unit Sector(s)

Not applicable.

Competency field

Common.

NWP261A Operate and maintain water treatment plant and equipment

Modification History

NWP261A Release 2: Layout adjusted. No changes to content.

NWP261A Release 1: Primary release.

Unit Descriptor

This unit of competency describes the outcomes required to operate water treatment processes within potable community and industrial water treatment plants in urban and rural areas. The ability to operate water treatment processes in compliance with relevant water legislation and regulations, and Australian Drinking Water Guidelines is vital to performance.

Application of the Unit

This unit supports the attainment of skills and knowledge required for operational staff in water treatment plants with responsibility for the practical and safe operation of plant, equipment and processes.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency. Performance criteria describe the required performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Operate water treatment processes.	<p>1.1 Identify <i>reasons and requirements</i> for treatment of water.</p> <p>1.2 Identify major components of <i>water treatment processes</i>.</p> <p>1.3 Identify and apply practices undertaken in water treatment processes.</p> <p>1.4 Operate <i>mechanical equipment</i> used in water treatment according to manufacturer specifications and organisational requirements.</p> <p>1.5 Handle, use, store and dose <i>chemicals</i> according to organisational procedures.</p>
2 Maintain items of equipment used in water treatment processes.	<p>2.1 Identify maintenance requirements and schedules according to standard operating procedures.</p> <p>2.2 Complete maintenance and cleaning requirements of equipment.</p>
3 Follow safety requirements for work in a water treatment plant.	<p>3.1 Identify and record hazards of working in a water treatment plant.</p> <p>3.2 Identify and record operational requirements for the safe and effective use of equipment.</p> <p>3.3 Select, fit and use safety equipment, including personal protective equipment.</p> <p>3.4 Identify and apply safe work practices when handling chemicals and working in a water treatment plant.</p>
4 Complete documentation.	<p>4.1 Complete records required for effective operation of a water treatment plant according to organisational requirements.</p> <p>4.2 Identify and record range of data routinely collected.</p> <p>4.3 Identify data that falls outside normal operating parameters and report for further action.</p>

Required Skills and Knowledge

This describes the essential skills and knowledge and their level, required for this unit.

Required skills:

- apply policies, procedures and standards
- recognise and report operational problems
- use safety equipment and personal protective equipment
- collect and test samples
- interpret material safety data sheets (MSDS)
- receive and apply instructions
- use literacy skills in regard to verbal and written communication in the workplace
- communicate with other employees and people that interact within work environment

Required knowledge:

- water cycle
- sources of water
- uses of water, both domestic and industrial
- physical, chemical and microbiological characteristics of water within the water treatment process
- water quality characteristics
- reasons for water treatment
- types of treatment plants and processes
- major chemicals and equipment used
- water treatment plant hazards
- safety equipment
- reasons for data and information collection

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

The candidate should demonstrate the ability to operate water treatment processes within potable community and industrial water treatment plants in urban and rural areas including:

- applying water treatment processes, including operating mechanical equipment
- using chemicals safely and according to organisational procedures
- conducting regular routine inspection of mechanical equipment
- identifying hazards and applying appropriate safety procedures
- gathering and recording data
- reporting anomalies

Context of and specific resources for assessment

Access to the workplace and resources including:

- documentation that should normally be available in a water industry organisation
- relevant codes, standards and government regulations

Where applicable, physical resources should include equipment modified for people with disabilities.

Access must be provided to appropriate learning and assessment support when required.

Assessment processes and techniques must be culturally appropriate, and appropriate to the language and literacy capacity of the candidate and the work being performed.

Validity and sufficiency of evidence requires that:

- competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace
- where the assessment is part of a structured learning experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice
- a decision of competence only taken at the point when the assessor has complete confidence in the person's competence over time and in various contexts
- all assessment that is part of a structured learning

experience must include a combination of direct, indirect and supplementary evidence

- where assessment is for the purpose of recognition (RCC/RPL), the evidence provided will need to be authenticated and show that it represents competency demonstrated over a period of time
- assessment can be through simulated project-based activity and must include evidence relating to each of the elements in this unit

Questioning will be undertaken in a manner appropriate to the skill levels of the operator and cultural issues that may affect responses to the questions, and will reflect the requirements of the competency and the work being performed.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

Reasons and requirements for treatment include:

- ensuring conformity with standards and guidelines, including Australian Drinking Water Guidelines
- removal of impurities, contaminants and pollution
- impact of impurities on water treatment processes
- relevant water legislation and regulations relating to water and the environment
- hazard analysis critical control point (HACCP) operational philosophy

Water treatment processes may include:

- screens
- coagulation and flocculation
- sedimentation clarification
- dissolved air flotation
- granular and membrane filtration
- disinfection
- aeration and oxidation
- fluoridation
- reverse osmosis
- ion exchange
- activated carbon adsorption
- calibration of dosing equipment
- softening
- backwash water treatment

Mechanical equipment may include:

- pumps, including:
 - centrifugal
 - positive displacement
 - airlift
- blowers and compressors
- mixers and chemical batching facilities
- control valves
- electronic digital monitoring systems
- recording systems
- chemical testing and analysis equipment
- communication equipment
- flow meters
- alarms and process control systems

Chemicals and aids used may include:

- centrifuge
- belt filter press
- screens, including raked bar screens
- manual or hydraulic equipment
- lime
- soda ash
- aluminium and iron coagulants
- polymers
- chlorine
- fluoride
- carbon dioxide

Unit Sector(s)

Not applicable.

Competency field

Treatment.

R110HS202A Enter and work in confined spaces

Modification History

Not applicable.

Unit Descriptor

This unit covers the entering and working in confined spaces in resources and infrastructure industries. It includes planning and preparing for entry of confined spaces, entry and working in confined spaces, exiting confined spaces and cleaning up.

Application of the Unit

This unit is appropriate for those working in confined spaces (enclosed or partially enclosed) for the purpose of carrying out work or inspections and also is appropriate for those performing sentry or stand-by person roles, at worksites within:

- Civil construction
- Coal mining
- Drilling
- Extractive industries
- Metalliferous mining
- General construction

Licensing/Regulatory Information

Refer to Unit Descriptor.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

<p>Elements describe the essential outcomes of a unit of competency.</p>	<p>Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.</p>
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
<p>1. Plan and prepare for entering and working in confined spaces</p>	<p>1.1. Access, interpret and apply compliance documentation relevant to entering and working in confined spaces</p> <p>1.2. Obtain, confirm and apply work instructions relevant to the allotted task</p> <p>1.3. Obtain, confirm and apply safety requirements relevant to the allotted task</p> <p>1.4. Obtained authorisation (entry permit) to enter the confined space is in accordance with regulatory requirements</p> <p>1.5. Confirm the emergency response procedure is with the stand-by person</p> <p>1.6. Identify, obtain and implement signage and barrier requirements as required by the project plan</p> <p>1.7. Select tools and equipment to carry out tasks that are consistent with the requirements of the job and check them for serviceability and rectify or report any faults</p> <p>1.8. Identify, confirm and apply to the allotted task the environmental protection requirements from the project environmental management plan</p> <p>1.9. Position rescue equipment as required by the entry permit close to the point of entry</p>
<p>2. Enter and work in the confined space</p>	<p>2.1. Gain access to the confined space</p> <p>2.2. Ensure that the atmosphere is tested and monitored for harmful elements in accordance with procedures</p> <p>2.3. Apply tagging and lock-out procedures as required</p> <p>2.4. Enter the confined space according to agreed procedure</p> <p>2.5. Maintain communication with the stand-by person</p> <p>2.6. Comply with entry permit requirements while carrying out designated work in confined space</p> <p>2.7. Monitor and adhere to allocated entry time</p>

3. Exit confined space	3.1.Exit confined space according to agreed procedure 3.2.Recover tools, equipment and materials from the confined space 3.3.Conduct inspection of the confined space 3.4. Secure access according to site procedures 3.5.Remove tagging and lock-out according to site procedures 3.6.Complete confined space entry permit
4. Clean up	4.1.Clear work area and dispose of or recycle materials in accordance with project environmental management plan 4.2.Clean, check, maintain and store tools and equipment in accordance recommendations and standard work practices 4.3.Remove, clean and store barriers and signs

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

Specific skills are required to achieve the performance criteria in this unit, particularly for the application in the various circumstances in which this unit may be applied. This includes the ability to carry out the following as required to enter and work in confined spaces:

- apply legislative, organisation and site requirements and procedures
- apply operational, maintenance and basic diagnostic procedures
- apply materials handling methods
- use atmospheric monitoring devices
- interpret JSAs/Safe work method statements

Required knowledge

Specific knowledge is required to achieve the performance criteria of this unit, particularly its application in a variety of circumstances in which the unit may be used. This includes knowledge of the following as required to enter and work in confined spaces:

- site and equipment safety requirements
- confined space entry and exit procedures, risks and regulations
- air contaminants and toxic gases
- breathing apparatus limitations
- equipment types, characteristics, technical capabilities and limitations
- site isolation and site control responsibilities and authorities
- materials safety data sheets (MSDS)
- project quality requirements
- industry terminology
- state and territory interpretations of a confined space

Evidence Guide

<p>The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
<p>Overview of assessment</p>	
<p>Critical aspects for assessment and evidence required to demonstrate competency in this unit</p>	<p>The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the performance criteria, required skills and knowledge and the range statement of this unit and include evidence of the following:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for entering and working in confined spaces • implementation of requirements, procedures and techniques for the safe, effective and efficient completion for entering and working in confined spaces • working with others to undertake and complete the entering and working in confined spaces that meet all of the required outcomes • consistent timely completion of entering and working in confined spaces that safely, effectively and efficiently meets the required outcomes
<p>Context of and specific resources for assessment</p>	<ul style="list-style-type: none"> • This unit must be assessed in the context of the work environment. Where personal safety or environmental damage are limiting factors, assessment may occur in a simulated environment provided it is realistic and sufficiently rigorous to cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills. • The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job. • Customisation of assessment and delivery environment to sensitively accommodate cultural diversity. • Aboriginal people and other people from a non

	<p>English speaking background may have second language issues.</p> <ul style="list-style-type: none"> • Assessment of this competency requires typical resources normally used in the work environment. Selection and use of resources for particular work sites may differ due to site circumstances. • Where applicable, physical resources should include equipment modified for people with disabilities. • Access must be provided to appropriate learning and/or assessment support when required.
Method of assessment	<p>This unit may be assessed in a holistic way with other units of competency. The assessment strategy for this unit must verify required knowledge and skill and practical application using more than one of the following assessment methods:</p> <ul style="list-style-type: none"> • written and/or oral assessment of the candidate's required knowledge • observed, documented and/or first hand testimonial evidence of the candidate's: <ul style="list-style-type: none"> • implementation of appropriate requirement, procedures and techniques for the safe, effective and efficient achievement of required outcomes • consistently achieving the required outcomes • first hand testimonial evidence of the candidate's: <ul style="list-style-type: none"> • working with others to undertake and complete the entering and working in confined spaces
Guidance information for assessment	<ul style="list-style-type: none"> • Consult the SkillsDMC User Guide for further information on assessment including access and equity issues.

Range Statement

<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
<p>Relevant compliance documentation may include:</p>	<ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Australian standards • code of practice • Employment and Workplace Relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
<p>Work instructions may include:</p>	<ul style="list-style-type: none"> • plans • specifications • quality requirements • operational details
<p>Safety requirements may be included in:</p>	<ul style="list-style-type: none"> • site safety plans • organisational policies and procedures • statutory/regulatory authorities which may include: <ul style="list-style-type: none"> • federal • state and • local authorities • verbal or written and graphical instructions • signage • work schedules/plans/specifications • work bulletins • charts and hand drawings • memos • maps • materials safety data sheets (MSDS) • diagrams or sketches • safe work procedures or equivalent related to working in confined spaces • regulatory/legislative requirements pertaining to working in confined spaces • manufacturer's specifications and instructions • organisation's work specifications and

	<ul style="list-style-type: none"> requirements • instructions issued by authorised organisational or external personnel • relevant Australian standards
Safety requirements may include:	<ul style="list-style-type: none"> • OHS requirements • personal protective clothing and equipment as prescribed under legislation, regulation and workplace policies and practices • use of tools and equipment • workplace environment and safety • handling of materials • use of fire fighting equipment • use of First Aid equipment • hazard control and hazardous materials and substances • safe operating procedures including recognising and preventing hazards associated with working in confined spaces, working in proximity to others, worksite visitors and the public • hazards and risks may include but not be limited to fires, underground services, excavations, traffic, hazardous materials, contaminated atmosphere and toxic gases • risks associated with confined spaces may include but not be limited to restricted means of entry and exit, atmosphere which contains potentially harmful levels of contaminant, unsafe oxygen levels or engulfment • respiratory protection devices are to include but not be limited to air purifying respirators and may include self contained compressed air breathing apparatus, supplied airline breathing apparatus and escape breathing apparatus and atmospheric monitoring devices
Confined space entry permit , or work permits, may include:	<ul style="list-style-type: none"> • location of work • duration of work • size of work crew • atmospheric testing requirements • personal protective equipment • hot work • stand-by personnel • rescue arrangements • other precautions (signs, barriers)

	<ul style="list-style-type: none"> • authorisation
Confined spaces may include:	<ul style="list-style-type: none"> • storage tanks, tank cars, process vessels, boilers, pressure vessels, silos and other tank-like compartments • open-topped spaces such as pits or degreasers • pipes, sewers, shafts, ducts and similar structures • shipboard spaces entered through a small hatchway or access point, cargo tanks, cellular double bottom tanks, duct keels, ballast and oil tanks and void spaces (but not including dry cargo holds)
Signage may include:	<ul style="list-style-type: none"> • site safety signage • temporary signage for the benefit of motorists • pedestrians and barricades
Environmental protection requirements may include:	<ul style="list-style-type: none"> • organisational/project environmental management plan • waste management • water quality protection • noise • vibration • dust • clean-up management
Gain access may include:	<ul style="list-style-type: none"> • removing access cover • installing and securing ladder
Communications may include:	<ul style="list-style-type: none"> • verbal instructions • fault reporting • 2-way radio • hand signals • mobile phone • site specific instructions • written instructions • instructions related to job/task
Secure access may include:	<ul style="list-style-type: none"> • replacing or closing off access cover
Tools and equipment may include:	<ul style="list-style-type: none"> • harness and lifeline • respirator apparatus • atmospheric testing equipment • signs • barricades • communication devices • tools and equipment relevant to the work to be

	performed
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Unit Sector(s)

Occupational Health and Safety

Competency field

Refer to Unit Sector(s).

Co-requisite units

Not applicable.

RIIOHS204A Work safely at heights

Modification History

Not applicable.

Unit Descriptor

This unit covers working safely at heights in resources and infrastructure industries. It includes: identifying the work requirements, work procedures and instructions for the task; accessing and installing equipment; performing work at heights; and cleaning up the work area.

Application of the Unit

This unit specifies the competency required to undertake safe working practices when working at heights or depths.

This unit is appropriate for those working in a operational roles, at worksites within:

- Civil construction
- Coal mining
- Drilling
- Extractive industries
- Metalliferous mining

Licensing/Regulatory Information

Refer to Unit Descriptor.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

<p>Elements describe the essential outcomes of a unit of competency.</p>	<p>Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.</p>
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Identify work requirements	1.1. Access, interpret and apply compliance documentation relevant to working safely at heights 1.2. Identify the scope of the task 1.3. Adhere to OHS requirements associated with working safely at heights, and the workplace environment throughout the work 1.4. Inspect site to determine layout and physical condition, condition of structures, prevailing weather conditions, equipment requirements and potential hazards 1.5. Identify and document scope of the task and proposed work practices/activities 1.6. Identify, select and check safety equipment for serviceability 1.7. Identify, manage and report potential risks and hazards
2. Identify work procedures and instructions for the task	2.1. Select materials, tools and equipment , including personal safety equipment, and check for serviceability 2.2. Inspect/install fall protection and perimeter protection equipment ensuring adequacy for work and conformance to regulatory requirements 2.3. Identify approved methods of moving tools and equipment to work area and minimise potential hazards associated with tools at heights 2.4. Install safety system in accordance with requirements 2.5. Select and install appropriate signs and barricades
3. Access and install equipment	3.1. Correctly fit, adjust and anchor fall protection and associated equipment 3.2. Make appropriate arrangements to install required equipment 3.3. Use recommended methods to access work area for people, tools and equipment 3.4. Place tools and materials to eliminate or minimise the risk of items being knocked

	down
4. Perform work at heights	<p>4.1. Check access from ground to work area to ensure it is safe and in accordance with requirements</p> <p>4.2. Keep fall equipment in place and adjusted appropriately to all for movement during work</p> <p>4.3. Undertake manual handling of materials and equipment in accordance with requirements</p> <p>4.4. Locate materials and equipment ensuring that they are safely secured and distributed</p> <p>4.5. Check safety system periodically for compliance with requirements and procedures</p> <p>4.6. Monitor risk control measures to ensure that they are effective and appropriate to the task and work environment</p> <p>4.7. Reassess risk control measures, as required, in accordance with changed work practices and/or site conditions and undertake alterations</p>
5. Clean up work area	<p>5.1. Dismantle safety system in accordance with sequence and remove from worksite</p> <p>5.2. Clear work area and dispose of or recycle materials</p> <p>5.3. Clean, check, maintain and store tools and equipment</p>

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

Specific skills are required to achieve the performance criteria in this unit, particularly for the application in the various circumstances in which this unit may be applied. This includes the ability to carry out the following as required to work safely at heights:

- apply legislative, organisation and site requirements and procedures
- access, interpret and apply technical and safety information
- apply diagnostic/faultfinding techniques
- apply environmental requirements
- apply isolation procedures
- work in varying weather conditions

Required knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly its application in a variety of circumstances in which the unit may be used. This includes knowledge of the following, as required to work safely at heights:

- the names and functions of equipment, components and materials
- equipment manufacturer's instructions and specifications
- safe shifting and handling of tools and materials
- statutory and regulatory authority requirements
- the nature of work undertaken at heights
- heights safety systems
- the processes of providing for safe working practices
- safety equipment/systems and considerations to facilitate working safely at heights
- safe work methods

Evidence Guide

<p>The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
<p>Overview of assessment</p>	
<p>Critical aspects for assessment and evidence required to demonstrate competency in this unit</p>	<p>The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the performance criteria, required skills and knowledge and the range statement of this unit and include evidence of the following:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for working safely at heights • implementation of requirements, procedures and techniques for safe, effective and efficient working at heights • working with others to undertake and complete work safely at heights that meets all of the required outcomes • consistent timely completion of work at heights that safely, effectively and efficiently meets the required outcomes
<p>Context of and specific resources for assessment</p>	<ul style="list-style-type: none"> • This unit must be assessed in the context of the work environment. Where personal safety or environmental damage are limiting factors, assessment may occur in a simulated environment provided it is realistic and sufficiently rigorous to cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills. • The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job. • Customisation of assessment and delivery environment to sensitively accommodate cultural diversity. • Aboriginal people and other people from a non English speaking background may have second language issues.

	<ul style="list-style-type: none"> • Assessment of this competency requires typical resources normally used in the work environment. Selection and use of resources for particular worksites may differ due to site circumstances. • Where applicable, physical resources should include equipment modified for people with disabilities. • Access must be provided to appropriate learning and/or assessment support when required.
Method of assessment	<p>This unit may be assessed in a holistic way with other units of competency. The assessment strategy for this unit must verify required knowledge and skill and practical application using more than one of the following assessment methods:</p> <ul style="list-style-type: none"> • written and/or oral assessment of the candidate's required knowledge • observed, documented and/or first hand testimonial evidence of the candidate's: <ul style="list-style-type: none"> • implementation of appropriate requirement, procedures and techniques for the safe, effective and efficient achievement of required outcomes • consistently achieving the required outcomes • first hand testimonial evidence of the candidate's: <ul style="list-style-type: none"> • working with others to undertake and complete work safely at heights
Guidance information for assessment	Consult the SkillsDMC User Guide for further information on assessment including access and equity issues.

Range Statement

<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
<p>Relevant compliance documentation may include:</p>	<ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Australian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
<p>OHS requirements may include those associated with:</p>	<ul style="list-style-type: none"> • protective clothing and equipment • use of tools and equipment • workplace environment and safety • handling of materials • use of fire fighting equipment • use of First Aid equipment • hazard control • hazardous materials and substances
<p>Hazards may include:</p>	<ul style="list-style-type: none"> • falling objects • removal of scaffold components • inappropriate carrying of materials on ladders • excessive bending or twisting in different work situations
<p>Tools and equipment may include:</p>	<ul style="list-style-type: none"> • fall protection • perimeter protection • signage and barricades • ladders • lifting/load shifting equipment including: • hand trolleys • rollers • forklifts • chain blocks • hoists • jacks • scaffolds

	<ul style="list-style-type: none">• elevated work platforms• lifting equipment (such as cranes)
Safety systems may include:	<ul style="list-style-type: none">• scaffolds• handrails• foot walks• kickboards• safety harness• harness fixing points

Unit Sector(s)

Occupational Health and Safety

Competency field

Refer to Unit Sector(s).

Co-requisite units

Not applicable.

RIIOHS205A Control traffic with stop-slow bat

Modification History

Not applicable.

Unit Descriptor

This unit covers controlling of traffic with a stop-slow bat in resources and infrastructure industries. It includes: planning and preparing; coordinating traffic; operating radios; and cleaning up.

Application of the Unit

This unit is appropriate for those working in a operational roles, at worksites within:

- Civil construction
- Coal mining
- Drilling
- Extractive industries
- Metalliferous mining

Licensing/Regulatory Information

Refer to Unit Descriptor.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

<p>Elements describe the essential outcomes of a unit of competency.</p>	<p>Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.</p>
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan and prepare	1.1. Access, interpret and apply compliance documentation relevant to controlling of traffic with a stop-slow bat 1.2. Obtain, confirm and apply work instructions relevant to the allotted task 1.3. Obtain, confirm and apply safety requirements from the site safety plan and organisational policies and procedures for the allotted task 1.4. Identify, obtain and implement signage and devices requirements from the project traffic management plan 1.5. Select tools and equipment to carry out tasks that are consistent with the requirements of the job; check them for serviceability and rectify or report any faults 1.6. Identify, confirm and apply environmental protection requirements from the project environmental management plan
2. Coordinate traffic	2.1. Position or confirm temporary traffic signs and barriers in accordance with regulations 2.2. Direct traffic in accordance with site traffic plan and away from services or areas of potential damage or danger 2.3. Control vehicles and pedestrian traffic within the worksite to ensure safety of workers 2.4. Monitor traffic, and make adjustments for changing conditions , and position waiting vehicles to allow for smooth traffic flow 2.5. Use hand held stop/slow bats in accordance with regulatory authority approved procedures 2.6. Use hand signals in accordance with regulatory authority approved procedures 2.7. Report traffic offenders in accordance with regulatory authority approved procedures
3. Operate radio	3.1. Adjust radio controls for optimum reception/transmission results 3.2. Transmit messages concisely and in

	<p>accordance with operating procedures or best practice</p> <p>3.3.Maintain radio power supply</p> <p>3.4.Check radio contact after nominated period of non contact</p>
<p>4. Clean up</p>	<p>4.1.Remove or cover signs and devices sequentially to provide warning to motorists during shutdown</p> <p>4.2.Clean, check, maintain and store tools and equipment in accordance with recommendations and standard work practices</p>

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

Specific skills are required to achieve the performance criteria in this unit, particularly for the application in the various circumstances in which this unit may be applied. This includes the ability to carry out the following as required to control traffic with a stop-slow bat:

- apply legislative, organisation and site requirements and procedures

Required knowledge

Specific knowledge is required to achieve the Performance Criteria of this unit, particularly its application in a variety of circumstances in which the unit may be used. This includes knowledge of the following, as required to control traffic with a stop-slow bat:

- site and equipment safety requirements
- traffic controlling
- traffic management plans
- traffic control signage and barricades
- radio operations
- equipment types, characteristics, technical capabilities and limitations
- operational and maintenance procedures for equipment
- site isolation and traffic control responsibilities and authorities
- affects of travel speed and vehicle mass on stopping distances
- quality requirements
- JSAs/Safe work method statement

Evidence Guide

<p>The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
<p>Overview of assessment</p>	
<p>Critical aspects for assessment and evidence required to demonstrate competency in this unit</p>	<p>The evidence required to demonstrate competency in this unit must be relevant to worksite operations and satisfy all of the requirements of the performance criteria, required skills and knowledge and the range statement of this unit and include evidence of the following:</p> <ul style="list-style-type: none"> • knowledge of the requirements, procedures and instructions for controlling traffic with a stop-slow bat • implementation of requirements, procedures and techniques for the safe, effective and efficient control of traffic with a stop-slow bat • working with others to control traffic with a stop-slow bat that meets all of the required outcomes • consistent timely control of traffic with a stop-slow bat that safely, effectively and efficiently meets the required outcomes
<p>Context of and specific resources for assessment</p>	<ul style="list-style-type: none"> • This unit must be assessed in the context of the work environment. Where personal safety or environmental damage are limiting factors, assessment may occur in a simulated environment provided it is realistic and sufficiently rigorous to cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills. • Evidence for assessment is best gathered using the outcomes of products and processes of the workplace context. • The assessment environment should not disadvantage the participant. For example, language, literacy and numeracy demands of assessment should not be greater than those required on the job. • Customisation of assessment and delivery environment to sensitively accommodate

	<p>cultural diversity.</p> <ul style="list-style-type: none"> • Aboriginal people and other people from a non English speaking background may have second language issues. • Assessment of this competency requires typical resources normally used in the work environment. Selection and use of resources for particular worksites may differ due to site circumstances. • Where applicable, physical resources should include equipment modified for people with disabilities. • Access must be provided to appropriate learning and/or assessment support when required.
Method of assessment	<p>This unit may be assessed in a holistic way with other units of competency. The assessment strategy for this unit must verify required knowledge and skill and practical application using more than one of the following assessment methods:</p> <ul style="list-style-type: none"> • written and/or oral assessment of the candidate's required knowledge • observed, documented and/or first hand testimonial evidence of the candidate's: <ul style="list-style-type: none"> • implementation of appropriate requirement, procedures and techniques for the safe, effective and efficient achievement of required outcomes • consistently achieving the required outcomes • first hand testimonial evidence of the candidate's: <ul style="list-style-type: none"> • working with others to control traffic with a stop-slow bat
Guidance information for assessment	<p>Consult the SkillsDMC User Guide for further information on assessment including access and equity issues.</p>

Range Statement

<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
<p>Relevant compliance documentation may include:</p>	<ul style="list-style-type: none"> • legislative, organisation and site requirements and procedures • manufacturer's guidelines and specifications • Australian standards • code of practice • Employment and workplace relations legislation • Equal Employment Opportunity and Disability Discrimination legislation
<p>Work instructions may be received via verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, charts and hand drawings, memos, maps, materials safety data sheets (MSDS) and diagrams or sketches and may include:</p>	<ul style="list-style-type: none"> • plans • specifications • quality requirements • operational details • safe work procedures or equivalent • regulatory/legislative requirements • manufacturers' specifications and instructions • organisation work specifications and requirements • instructions issued by authorised organisational or external personnel • relevant Australian Standards
<p>Safety requirements may include:</p>	<ul style="list-style-type: none"> • those included in compliance documentation • personal protective equipment • safe operating procedures, including recognising and preventing hazards associated with: <ul style="list-style-type: none"> • uneven/unstable terrain • trees • pits • poles • trip hazards • dirt mounds • overhead services

	<ul style="list-style-type: none"> • underground services • bridges • surrounding buildings • obstructions • structures • facilities • fires • excavations • traffic • embankments • cuttings • hazardous materials • recently filled trenches • other machines • personnel • restricted access barriers • traffic control • working in proximity to others • worksite visitors and the public • safe parking practices, including: <ul style="list-style-type: none"> • ensuring access ways are clear • equipment/machinery is away from overhangs and refuelling sites • safe distance from excavations • secured from unauthorised access or movement
<p>Signage and devices are to include:</p>	<ul style="list-style-type: none"> • temporary warning signs • regulatory and traffic cones
<p>Signage and devices may include:</p>	<ul style="list-style-type: none"> • vehicle mounted signs and flashing lights • guide signs • warning signs • barriers • hazard markers • bollards • arrow boards
<p>Tools and equipment are to include:</p>	<ul style="list-style-type: none"> • radio • stop-slow bat • high visibility vest • traffic cones • signage

Tools and equipment may include:	<ul style="list-style-type: none"> • warning lights and beacons • arrow boards
Environmental include the requirements of the organisational/ project environmental management plan, and may include:	<ul style="list-style-type: none"> • waste management • water quality protection • noise, vibration and dust management • clean-up management
Trafficconditions may include	<ul style="list-style-type: none"> • congested urban environments • low traffic rural areas • off-road un-trafficked areas • buildings • parking sites • pedestrian areas
Radios may include:	<ul style="list-style-type: none"> • VHF and UHF

Unit Sector(s)

Occupational Health and Safety

Competency field

Refer to Unit Sector(s).

Co-requisite units

Not applicable.

TLIC3003A Drive medium rigid vehicle

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

This unit involves the skills and knowledge required to drive a medium rigid vehicle safely including systematic and efficient control of all vehicle functions, monitoring of traffic and road conditions, management of vehicle condition and performance and effective management of hazardous situations. Assessment of this unit may be undertaken within a licensing examination conducted by, or under the authority of, the relevant state/territory Road Traffic Authority. Licensing, legislative, regulatory or certification requirements are applicable to this unit.

Application of the Unit

Application of the Unit

Driving must be carried out in compliance with the licence requirements and regulations of the relevant state/territory roads and traffic authority pertaining to medium rigid vehicles.

Driving is performed with limited or minimum supervision, with limited accountability and responsibility for self and others in achieving the prescribed outcomes.

Driving involves the application of routine vehicle driving principles and procedures to maintain the safety and operation of a commercial medium rigid vehicle across a variety of driving contexts.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Not Applicable

Employability Skills Information

Employability Skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Drive the medium rigid vehicle	<p>1.1 The medium rigid vehicle is started, steered, manoeuvred, positioned and stopped in accordance with traffic regulations and manufacturers instructions</p> <p>1.2 Engine power is managed to ensure efficiency and performance and to minimise engine and transmission damage</p> <p>1.3 Engine operation is maintained within the manufacturer's specified torque range and temperature through effective transmission use</p> <p>1.4 Braking system of medium rigid vehicle is managed and operated to ensure effective control of the vehicle under all conditions</p> <p>1.5 Driving hazards are identified and/or anticipated and avoided or controlled through defensive driving</p> <p>1.6 The medium rigid vehicle is driven in reverse, maintaining visibility and achieving accurate positioning</p> <p>1.7 The medium rigid vehicle is parked, shut down and secured in accordance with manufacturers specifications, traffic regulations and workplace procedures</p> <p>1.8 Appropriate procedures are followed in the event of a driving emergency</p>
2 Monitor traffic and road conditions	<p>2.1 The most efficient route of travel is taken through monitoring and anticipation of traffic flows and conditions, road standards and other factors likely to cause delays or route deviations</p> <p>2.2 Traffic and road conditions are constantly monitored and acted upon to enable safe operation and to ensure no injury to people or damage to property, equipment, loads and facilities</p>
3 Monitor and maintain vehicle performance	<p>3.1 Vehicle performance is maintained through pre-operational inspections and checks of the vehicle</p> <p>3.2 Performance and efficiency of vehicle operation is monitored during use</p> <p>3.3 Defective or irregular performance or malfunctions are reported to the appropriate authority</p> <p>3.4 Vehicle records are maintained/updated and information is processed in accordance with workplace procedures</p>

Required Skills and Knowledge

REQUIRED KNOWLEDGE AND SKILLS

REQUIRED KNOWLEDGE AND SKILLS

This describes the essential knowledge and skills and their level required for this unit.

Required knowledge:

- Relevant road rules, regulations, permit and licence requirements of the relevant state/territory road traffic authority
- Relevant OH&S and environmental procedures and regulations
- Medium rigid vehicle controls, instruments and indicators and their use
- Medium rigid vehicle handling procedures
- Procedures to be followed in the event of a driving emergency
- Engine power management and safe driving strategies
- Efficient driving techniques
- Workplace driving and operational instructions
- Driving hazards and related defensive driving techniques
- Pre-operational checks carried out on vehicle and related action
- Differences between transmission types
- Principles of operation of air brakes and procedures for their use
- Principles of stress management when driving a vehicle
- Map reading and road navigation techniques including the use of a GPS device where applicable
- Factors which may cause traffic delays and diversions and related action that can be taken by a driver
- Causes and effects of fatigue on drivers
- Factors which increase fatigue-related accidents
- Fatigue management strategies including on-road techniques
- Lifestyles which promote the effective long-term management of fatigue

Required skills:

- Communicate effectively with others when driving a medium rigid vehicle
- Read and interpret instructions, procedures, information and signs relevant to work activities
- Interpret and follow operational instructions and prioritise work
- Complete documentation related to work activities
- Operate electronic communication equipment to required protocol
- Work collaboratively with others when driving a medium rigid vehicle
- Adapt appropriately to cultural differences in the workplace, including modes of behaviour and interactions with others
- Promptly report and/or rectify any identified problems, faults or malfunctions that may occur when driving a medium rigid vehicle in accordance with regulatory requirements and

Required skills:

- workplace procedures
- Implement contingency plans for unexpected events when driving a medium rigid vehicle
- Apply precautions and required action to minimise, control or eliminate hazards that may exist during work activities
- Monitor work activities in terms of planned schedule
- Modify activities depending on differing operational contingencies, risk situations and environments
- Apply fatigue management knowledge and techniques
- Work systematically with required attention to detail without injury to self or others, or damage to goods or equipment
- Operate and adapt to differences in equipment in accordance with standard operating procedures
- Select and use required personal protective equipment conforming to industry and OH&S standards
- Monitor performance of equipment
- Monitor and anticipate traffic hazards and take appropriate action
- Carry out pre-operational checks on a medium rigid vehicle
- Check and replenish fluids and carry out lubrication processes in the course of work activities

Evidence Guide**EVIDENCE GUIDE**

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills, the range statement and the assessment guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria of this unit and include demonstration of applying:
 - the underpinning knowledge and skills
 - relevant legislation and workplace procedures
 - other relevant aspects of the range statement

Context of and specific resources for assessment

- Performance is demonstrated consistently over a period of time and in a suitable range of contexts
- Resources for assessment include:
 - a range of relevant exercises, case studies and/or other simulated practical and knowledge assessment,

EVIDENCE GUIDE

and/or

- access to an appropriate range of relevant operational situations in the workplace
- In both real and simulated environments, access is required to:
 - relevant and appropriate materials and equipment, and
 - applicable documentation including workplace procedures, regulations, codes of practice and operation manuals

Method of assessment

- Assessment of this unit must be undertaken by a registered training organisation
- As a minimum, assessment of knowledge must be conducted through appropriate written/oral tests
- Practical assessment must occur:
 - through activities in an appropriately simulated environment at the registered training organisation, and/or
 - in an appropriate range of situations in the workplace

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Type of vehicle includes:

- all medium rigid vehicles, for example any 2-axle rigid vehicle, including truck and bus greater than 8 tonnes GVM

Driving may be carried out in typical road transport situations, including:

- operations conducted at day or night
- typical weather conditions
- on the open road
- on a private road
- while at a depot, base or warehouse
- while at a client's workplace or work site

Vehicle handling procedures may include:

- starting a vehicle
- steering and manoeuvring a vehicle
- accelerating and braking
- positioning and stopping a vehicle

RANGE STATEMENT

- reversing a vehicle
 - operating vehicle controls, instruments and indicators
 - using air brakes
 - using defensive driving techniques
 - managing engine performance
- Pre-operational checks may include:
- visual check of vehicle
 - checking and topping up of fluid levels
 - checks of tyre pressures
 - checks of operation of vehicle lights and indicators
 - checks of brakes
- Minor routine repairs may include:
- replacement of blown globes in vehicle lights
 - replacement of broken fan belt
 - replacement of blown fuse
 - replacement of door mirrors
 - repairs to rear tail-light lens
 - changing of tyres
 - repair of tyre punctures
 - replacement of broken coolant hose
- Driving hazards may include (examples only):
- wet and iced roads
 - oil on road
 - animals and objects on road
 - fire in vehicle
 - leaking fuel
 - faulty brakes
 - parked vehicles on the road
 - faulty steering mechanism on vehicle
 - pedestrians crossing the road
 - flooded sections of road
 - windy sections of road
 - foggy conditions
- Factors that can cause traffic delays and diversions may include:
- traffic accidents
 - flooded sections of road
 - road damage
 - bridge/tunnel damage
 - road works
 - building construction
 - emergency situations such as bushfires, building fires, etc.
 - road closures for special events such as marches, parades, etc.
 - holiday traffic

RANGE STATEMENT

- Depending on the type of organisation concerned and the local terminology used, workplace procedures may include:
- Documentation/records may include:
- Applicable procedures and codes may include:
- road closures for utility works such as electricity, water, sewerage, telecommunications, gas, etc.
 - company procedures
 - enterprise procedures
 - organisational procedures
 - established procedures
 - state/territory medium rigid vehicle driving licence requirements
 - state/territory road rules
 - workplace driving instructions and procedures
 - vehicle manufacturers instructions, specifications and recommended driving procedures including preoperational checks of vehicle
 - emergency procedures
 - vehicle log book or record book (where required)
 - relevant state/territory roads and traffic authority driving regulations and licence requirements pertaining to medium rigid vehicles
 - relevant state/territory road rules
 - relevant state/territory permit regulations and requirements
 - relevant state/territory OH&S legislation
 - relevant state/territory fatigue management regulations
 - relevant state/territory environmental protection legislation

Unit Sector(s)

Not Applicable

Competency Field

Competency Field C - Vehicle Operation

TLIC3004A Drive heavy rigid vehicle

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

This unit involves the skills and knowledge required to drive a heavy rigid vehicle safely including systematic and efficient control of all vehicle functions, monitoring of traffic and road conditions, management of vehicle condition and performance, and effective management of hazardous situations. Assessment of this unit may be undertaken within a licensing examination conducted by, or under the authority of, the relevant state/territory Road Traffic Authority. Licensing, legislative, regulatory or certification requirements are applicable to this unit.

Application of the Unit

Application of the Unit

Driving must be carried out in compliance with the licence requirements and regulations of the relevant state/territory roads and traffic authority pertaining to heavy rigid vehicles.

Driving is performed with limited or minimum supervision, with limited accountability and responsibility for self and others in achieving the prescribed outcomes.

Driving involves the application of routine vehicle driving principles and procedures to maintain the safety and operation of a commercial heavy rigid vehicle across a variety of driving contexts.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Not Applicable

Employability Skills Information

Employability Skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Drive the heavy rigid vehicle

- 1.1 The heavy rigid vehicle is started, steered, manoeuvred, positioned and stopped in accordance with traffic regulations and manufacturers instructions
- 1.2 Engine power is managed to ensure efficiency and performance and to minimise engine and gear damage
- 1.3 Engine operation is maintained within the manufacturer's specified torque range and temperature through effective gear selection and smooth transition in gear changes
- 1.4 Braking system of heavy rigid vehicle is managed and operated to ensure effective control of the vehicle under all conditions
- 1.5 Driving hazards are identified and/or anticipated and avoided or controlled through defensive driving
- 1.6 The heavy rigid vehicle is driven in reverse, maintaining visibility and achieving accurate positioning.
- 1.7 The heavy rigid vehicle is parked, shut down and secured in accordance with manufacturers specifications, traffic regulations and workplace procedures
- 1.8 Where required, overwidth and overweight permit applications are undertaken in accordance with relevant regulatory requirements
- 1.9 Appropriate procedures are followed in the event of a driving emergency

2 Monitor traffic and road conditions

- 2.1 The most efficient route of travel is taken through monitoring and anticipation of traffic flows and conditions, road standards and other factors likely to cause delays or route deviations
- 2.2 Traffic and road conditions are constantly monitored and acted upon to enable safe operation and ensure no injury to people or damage to property, equipment loads and facilities

3 Monitor and maintain vehicle performance

- 3.1 Vehicle performance is maintained through pre-operational inspections and checks of the vehicle
- 3.2 Performance and efficiency of vehicle operation is monitored during use
- 3.3 Defective or irregular performance or malfunctions are reported to the appropriate authority
- 3.4 Vehicle records are maintained/updated and information is processed in accordance with workplace procedures

Required Skills and Knowledge

REQUIRED KNOWLEDGE AND SKILLS

This describes the essential knowledge and skills and their level required for this unit.

Required knowledge:

- Relevant road rules, regulations, permit and licence requirements of the relevant state/territory road traffic authority
- Relevant OH&S and environmental procedures and regulations
- Heavy rigid vehicle controls, instruments and indicators and their use
- Heavy rigid vehicle handling procedures
- Procedures to be followed in the event of a driving emergency
- Engine power management and safe driving strategies
- Efficient driving techniques
- Pre-operational checks carried out on heavy rigid vehicle and related action
- Differences between transmission types
- Principles of operation of air brakes and procedures for their use
- Workplace driving and operational instructions
- Driving hazards and related defensive driving techniques
- Principles of stress management when driving a vehicle
- Factors which may cause traffic delays and diversions and related action that can be taken by a driver
- Causes and effects of fatigue on drivers
- Factors which increase fatigue-related accidents
- Fatigue management strategies and on-road techniques
- Lifestyles which promote the effective long-term management of fatigue

Required skills:

- Communicate effectively with others when driving a commercial heavy rigid vehicle
- Read and interpret instructions, procedures, information and signs relevant to when the driving of a commercial heavy rigid vehicle
- Interpret and follow operational instructions and prioritise work
- Complete documentation related to the driving of a commercial heavy rigid vehicle
- Work collaboratively with others when driving a commercial heavy rigid vehicle
- Operate electronic communication equipment to required protocol
- Adapt appropriately to cultural differences in the workplace, including modes of behaviour and interactions with others
- Promptly report and/or rectify any identified problems, faults or malfunctions that may occur when driving a commercial heavy rigid vehicle in accordance with regulatory requirements and workplace procedures

Required skills:

- Implement contingency plans for unexpected events
- Apply precautions and required action to minimise, control or eliminate hazards that may exist when driving a commercial heavy rigid vehicle
- Monitor and anticipate traffic hazards and take appropriate action
- Modify activities depending on differing operational contingencies, risk situations and environments
- Apply fatigue management knowledge and techniques
- Work systematically with required attention to detail without injury to self or others, or damage to goods or equipment
- Operate and adapt to differences in equipment in accordance with standard operating procedures
- Select and use required personal protective equipment conforming to industry and OH&S standards
- Monitor performance of the vehicle and its equipment and take appropriate action where required
- Carry out pre-operational checks in the course of work activities

Evidence Guide**EVIDENCE GUIDE**

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills, the range statement and the assessment guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria of this unit and include demonstration of applying:
 - the underpinning knowledge and skills
 - relevant legislation and workplace procedures
 - other relevant aspects of the range statement

Context of and specific resources for assessment

- Performance is demonstrated consistently over a period of time and in a suitable range of contexts
- Resources for assessment include:
 - a range of relevant exercises, case studies and/or other simulated practical and knowledge assessment, and/or
 - access to an appropriate range of relevant operational

EVIDENCE GUIDE

- situations in the workplace
- In both real and simulated environments, access is required to:
 - relevant and appropriate materials and equipment, and
 - applicable documentation including workplace procedures, regulations, codes of practice and operation manuals
 - Assessment of this unit must be undertaken by a registered training organisation
 - As a minimum, assessment of knowledge must be conducted through appropriate written/oral tests
 - Practical assessment must occur:
 - through activities in an appropriately simulated environment at the registered training organisation, and/or
 - in an appropriate range of situations in the workplace

Method of assessment

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

- Type of vehicle includes:
- all heavy rigid vehicles, for example any rigid vehicle with 3 or more axles, including trucks or buses, greater than 8 tonnes GVM
- Driving may be carried out in typical road transport situations, including:
- operations conducted at day or night
 - typical weather conditions
 - on the open road
 - on a private road
 - while at a depot, base or warehouse
 - while at a client's workplace or work site
- Vehicle handling procedures may include:
- starting a vehicle
 - steering and manoeuvring a vehicle
 - accelerating and braking
 - positioning and stopping a vehicle
 - reversing a vehicle
 - operating vehicle controls, instruments and indicators

RANGE STATEMENT

- Pre-operational checks may include:
- using air brakes
 - using defensive driving techniques
 - managing engine performance
 - visual check of vehicle
 - checking and topping up of fluid levels
 - checks of tyre pressures
 - checks of operation of vehicle lights and indicators
 - checks of brakes
- Minor routine repairs may include:
- replacement of blown globes in vehicle lights
 - replacement of broken fan belt
 - replacement of blown fuse
 - replacement of door mirrors
 - repairs to rear tail-light lens
 - changing of tyres
 - repair of tyre punctures
 - replacement of broken coolant hose
- Driving hazards may include (examples only):
- wet and iced roads
 - oil on road
 - animals and objects on road
 - fire in vehicle
 - leaking fuel
 - faulty brakes
 - parked vehicles on the road
 - faulty steering mechanism on vehicle
 - pedestrians crossing the road
 - flooded sections of road
 - windy sections of road
 - foggy conditions
 - work site hazards including power and service lines, buildings, structures, facilities, underground services, uneven or unstable ground and recently filled trenches, stationary and moving machinery and equipment, hazardous or dangerous materials, noise, light, energy sources, and obstructions
- Factors that can cause traffic delays and diversions may include:
- traffic accidents
 - flooded sections of road
 - road damage
 - bridge/tunnel damage
 - road works
 - building construction
 - emergency situations such as bushfires, building fires, etc.

RANGE STATEMENT

- road closures for special events such as marches, parades, sporting events, etc.
 - holiday traffic
 - road closures for utility works such as electricity, water, sewerage, telecommunications, gas, etc.
- Depending on the type of organisation concerned and the local terminology used, workplace procedures may include:
- company procedures
 - enterprise procedures
 - organisational procedures
 - established procedures
- Documentation/records may include:
- state/territory heavy rigid vehicle driving licence and permit requirements
 - state/territory road rules
 - workplace driving instructions and procedures
 - vehicle manufacturers instructions, specifications and recommended driving procedures including preoperational checks of vehicle
 - emergency procedures
 - vehicle log book or record book (where required)
 - relevant standards and certification requirements
 - quality assurance procedures
- Applicable procedures and codes may include:
- relevant state/territory roads and traffic authority driving regulations and licence/permit requirements pertaining to heavy rigid vehicles
 - relevant state/territory road rules
 - relevant state/territory permit regulations and requirements
 - relevant state/territory OH&S legislation
 - relevant state/territory fatigue management regulations
 - relevant state/territory environmental protection legislation

Unit Sector(s)

Not Applicable

Competency Field

Competency Field C - Vehicle Operation

TLID3035A Operate a boom type elevating work platform

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

This unit involves the skills and knowledge required to operate a boom type elevating work platform, including inspecting and testing the elevating work platform, assessing job requirements and work, planning work and setting up for lift, carrying out the elevation, implementing planned hazard control and strategies, and packing up the work platform after operations. Licensing, legislative, regulatory or certification requirements are applicable to this unit.

Application of the Unit

Application of the Unit

Work must be carried out in compliance with the licence/permit requirements and regulations of the relevant state/territory authorities pertaining to boom type elevating work platform operations.

Work is performed with limited or minimum supervision, and with limited accountability and responsibility for self and others in achieving the prescribed outcomes. It involves the application of routine principles and procedures to the operation of a boom type elevating work platform in a variety of operational contexts.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Not Applicable

Employability Skills Information

Employability Skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Inspect and test elevating work platform	<ul style="list-style-type: none">1.1 Work platform is visually inspected prior to operation for any evidence of damage, structural weakness or interference according to pre-operational safety check procedures1.2 Routine pre-operational equipment checks are carried out in accordance with available checklists1.3 Work platform log book is checked, service requirements are noted and maintenance personnel advised of any requirements1.4 Elevating work platform is started in accordance with manufacturers guidelines and start-up procedures for operations and any abnormal noise or movement reported to an authorised person for corrective action1.5 Start-up checks are conducted according to manufacturers specifications and company procedures to ensure work platform and equipment are operating correctly1.6 Faults are corrected or are reported to an authorised person for corrective action according to company procedures1.7 The operating and emergency controls are checked for correct operation in accordance with manufacturers specifications including use of the emergency decent device1.8 Boom is lowered under simulated emergency conditions to check for operational effectiveness1.9 Gear and accessories are checked and damaged or worn gear is segregated and reported to an authorised person for testing/repair/destruction1.10 Results of inspections are recorded and reported according to company procedures
2 Assess job requirements and work	<ul style="list-style-type: none">2.1 Briefing, hand-over details, authorisations and clearances are received, interpreted and clarified in accordance with company and site procedures and legislative requirements2.2 Work area is inspected and potential hazards are identified and appropriate elimination or control measures selected2.3 Weight of load including personnel and equipment is correctly estimated to ensure job is within limits of work platform capacity
3 Plan work and set up for lift	<ul style="list-style-type: none">3.1 A work plan is developed and agreed with relevant workplace personnel to include hazard prevention/control measures and safety and emergency procedures in line with applicable Australian standards3.2 A suitable firm and level standing is chosen and prepared for the location of the elevating work platform3.3 Outriggers and stabilisers are correctly deployed and positioned

ELEMENT	PERFORMANCE CRITERIA
	in accordance with manufacturers instructions and appropriate Australian standards
	3.4 Appropriate plates or packing are correctly used under the footplates as required to adequately distribute the loading
	3.5 Ground is checked before and after packing is installed to ensure it is firm enough to bear the load
	3.6 The job plan is developed to include hazard prevention/control measures and safety procedures in line with applicable Australian standards and to equipment manufacturers specifications
	3.7 Work platform load chart is located and information on permissible loads, radii and heights taken into account in planning the job
	3.8 The job plan takes into account job requirements and workplace rules and procedures
	3.9 Job plan is discussed and confirmed with relevant personnel
	3.10 Work gear and tools are properly stowed in the elevating work platform in accordance with Australian standards, company procedures and guides
4 Carry out elevation	4.1 Configuration and operation of elevating work platform are checked as necessary to ensure safe lift
	4.2 Operation of work platform is carried out in accordance with the job plan, the appropriate Australian standard and manufacturers specifications
5 Planned hazard control and strategies are implemented	5.1 Load is constantly monitored to ensure safety of personnel, load and structural stability
	5.2 Unplanned situations are responded to in line with company procedures in a manner that minimises risk to personnel and equipment
	5.3 Required signals are correctly given, interpreted and followed in accordance with appropriate Australian standards
6 Pack up work platform	6.1 The elevating work platform is shut down using the correct sequence of procedures in accordance with manufacturers instructions
	6.2 Routine post-operational equipment checks are carried out in accordance with manufacturers instructions and available checklists and defects recorded and reported in line with company procedures
	6.3 The elevating work platform is dismantled in accordance with the job plan, manufacturers instructions and relevant statutory regulations
	6.4 The outriggers and stabilisers are secured and stowed in

ELEMENT**PERFORMANCE CRITERIA**

accordance with manufacturers instructions

6.5 The elevating work platform is correctly stowed and secured in accordance with manufacturers instructions and company procedures

Required Skills and Knowledge

REQUIRED KNOWLEDGE AND SKILLS

This describes the essential knowledge and skills and their level required for this unit.

Required knowledge:

- Relevant road rules, regulations, permit and licence requirements pertaining to boom type elevating work platform operation
- Relevant OH&S and environmental procedures and regulations
- Boom type elevating work platform applications, capacities, configurations, safety hazards and control mechanisms
- Workplace procedures concerning the operation of a boom type elevating work platform at a worksite
- Problems that may arise when operating a boom type elevating work platform and actions that should be taken to prevent or solve them
- Risks and hazards involved in the operation of a boom type elevating work platform and the associated action that can be taken to eliminate or minimise the risk/hazards concerned
- Focus of operation of work systems and equipment

Required skills:

- Communicate effectively with others when operating a boom type elevating work platform
- Read and interpret instructions, procedures, regulations, codes of practice and manuals relevant to the operation of a boom type elevating work platform
- Interpret and follow operational instructions
- Complete documentation related to the operation of a boom type elevating work platform
- Operate electronic communication equipment to required protocol
- Work collaboratively with others when operating a boom type elevating work platform
- Adapt appropriately to cultural differences in the workplace, including modes of behaviour and interactions with others
- Promptly report and/or rectify any identified problems, faults or malfunctions that may occur when operating a boom type elevating work platform in accordance with regulatory requirements and workplace procedures

Required skills:

- Plan own work including predicting consequences and identifying improvements
- Prioritise and multi-task work
- Implement contingency plans for unanticipated situations that may arise when operating a boom type elevating work platform
- Apply precautions and required action to minimise, control or eliminate hazards that may exist during the operation of a boom type elevating work platform
- Monitor work activities in terms of planned schedule
- Modify activities depending on differing operational contingencies, risk situations and environments
- Apply fatigue management knowledge and techniques
- Identify and correctly use equipment, processes and procedures
- Work systematically with required attention to detail without injury to self or others, or damage to goods or equipment
- Operate and adapt to differences in equipment in accordance with standard operating procedures
- Select and use required personal protective equipment conforming to industry and OH&S standards
- Monitor performance of equipment
- Service equipment in terms of maintenance schedule and standard operating procedures
- Check and replenish fluids and carry out lubrication processes in the course of work activities

Evidence Guide**EVIDENCE GUIDE**

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills, the range statement and the assessment guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria of this unit and include demonstration of applying:
 - the underpinning knowledge and skills
 - relevant legislation and workplace procedures
 - other relevant aspects of the range statement

Context of and specific resources for assessment

- Performance is demonstrated consistently over a period of time and in a suitable range of contexts
- Resources for assessment include:

EVIDENCE GUIDE

- a range of relevant exercises, case studies and/or other simulated practical and knowledge assessment, and/or
 - access to an appropriate range of relevant operational situations in the workplace
 - In both real and simulated environments, access is required to:
 - relevant and appropriate materials and equipment, and
 - applicable documentation including workplace procedures, regulations, codes of practice and operation manuals
- Method of assessment**
- Assessment of this unit must be undertaken by a registered training organisation
 - As a minimum, assessment of knowledge must be conducted through appropriate written/oral tests
 - Practical assessment must occur:
 - through activities in an appropriately simulated environment at the registered training organisation, and/or
 - in an appropriate range of situations in the workplace

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

- | | |
|--|--|
| Operations may be conducted: | <ul style="list-style-type: none"> • by day or night • in a variety of weather conditions |
| Environment may include movement of: | <ul style="list-style-type: none"> • equipment • goods • materials • vehicular traffic |
| Customers may be: | <ul style="list-style-type: none"> • internal or external |
| Boom type elevating work platform may be involved in work in a range of industry sectors | <ul style="list-style-type: none"> • construction and demolition • manufacturing • waterfront |

RANGE STATEMENT

including:

- mining
- primary industry
- utilities (electricity, gas, water)
- arboricultural
- swimming pool
- quarrying

Hazards may include:

- power lines
- noise, light, energy sources
- overhead service lines
- surrounding buildings, structures, facilities
- underground services
- obstructions
- uneven or unstable ground and recently filled trenches
- stationary and moving machinery and equipment
- hazardous or dangerous materials
- traffic hazards and congestion

Hazard management is consistent with:

- the principle of hierarchy of control with elimination, substitution, isolation and engineering control measures being selected before safe working practices and personal protective equipment

Consultative processes may involve:

- other employees and supervisors
- management
- union representatives
- clients
- industrial relations and OH&S specialists
- other professional or technical staff

Requirements for access and/or lift may include:

- site restrictions and procedures
- authorities and permits
- hours of operation
- induction
- slings, chains, nets, brackets and other specialised lifting equipment
- noise restrictions
- personal protective equipment
- support trucks
- additional gear and equipment
- communications equipment

Personal protective equipment may include:

- gloves
- safety headwear and footwear
- sunscreen, sunglasses and safety glasses

RANGE STATEMENT

- Elevating platforms may include:
- two-way radios
 - high visibility clothing
 - mechanically operated equipment
 - hydraulically operated equipment
 - electrically operated equipment
- Depending on the type of organisation concerned and the local terminology used, workplace procedures may include:
- company procedures
 - enterprise procedures
 - organisational procedures
 - established procedures
 - site procedures
- Documentation/records may include:
- operations manuals
 - Safe Working Load (SWL) and Working Load Limit (WLL)
 - site plans
 - induction documentation
 - competency standards and training materials
 - job specifications and procedures
 - manufacturers specifications
 - workplace operating procedures and policies
 - supplier and/or client instructions
 - communications technology equipment, oral, aural or signed communications
 - personal and work area work procedures and practices
 - conditions of service, legislation and industrial agreements including:
 - workplace agreements and awards
 - occupational health and safety procedures
 - standards and certification requirements
 - quality assurance procedures
 - emergency procedures
- Applicable procedures and codes may include:
- relevant state/territory regulations and licence/permit requirements pertaining to the operation of boom type elevating work platforms
 - relevant state/territory road rules
 - relevant state/territory OH&S legislation
 - relevant state/territory fatigue management regulations
 - relevant state/territory environmental protection legislation

Unit Sector(s)

Not Applicable

Competency Field

Competency Field D - Load Handling

TLIF2010A Apply fatigue management strategies

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

This unit involves the skills and knowledge required to apply fatigue management strategies, including identifying and acting upon signs of fatigue and implementing appropriate strategies to minimise fatigue during work activities, in accordance with legislative and regulatory requirements. Licensing or certification requirements are not applicable to this unit.

Application of the Unit

Application of the Unit

Persons achieving competence in this unit will need to fulfil the applicable federal and state/territory legislation and relevant regulations covering the management of fatigue in the workplace.

Work is performed under some supervision generally within a team environment. It involves the application of the relevant regulations, codes and guidelines of the federal government and state/territory authorities concerning fatigue management during work activities and in particular when operating equipment, trains, vehicles, load shifting equipment, marine vessels and aircraft.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Not Applicable

Employability Skills Information

Employability Skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Identify and act upon signs of fatigue	<p>1.1 Potential causes of fatigue are identified and action is taken to minimise their effects in accordance with company procedures</p> <p>1.2 Personal warning signs of fatigue are recognised and necessary steps are taken in accordance with workplace procedures to ensure that effective work capability and alertness are maintained</p>
2 Implement strategies to minimise fatigue	<p>2.1 Workplace procedures are assessed to minimise fatigue</p> <p>2.2 Factors which increase the risk of fatigue-related accidents and safety incidents are understood and minimised</p> <p>2.3 Strategies to manage fatigue are implemented in accordance with company policy</p> <p>2.4 Lifestyle choices are made which promote the effective long-term management of fatigue</p> <p>2.5 Effective practices in combating fatigue are adopted and applied</p> <p>2.6 Personal fatigue management strategies are communicated to other relevant people</p> <p>2.7 Appropriate counter measures are planned to combat fatigue</p>

Required Skills and Knowledge

REQUIRED KNOWLEDGE AND SKILLS

This describes the essential knowledge and skills and their level required for this unit.

Required knowledge:

- Relevant codes, regulations, permit and licence requirements related to fatigue management
- Relevant OH&S regulations as they relate to fatigue
- Workplace policies and procedures related to fatigue management and the control of factors that can contribute to fatigue and fatigue-related accidents
- Sources of information on fatigue
- The risks and hazards created by fatigue in the workplace
- How fatigue affects workplace performance
- How fatigue contributes to workplace accidents
- Ways of recognising fatigue
- Strategies and ways of managing fatigue
- Causes and effects of fatigue on workers/drivers
- Factors which increase fatigue-related accidents

REQUIRED KNOWLEDGE AND SKILLS

- Lifestyles which promote the effective long-term management of fatigue

Required skills:

- Communicate effectively with others when applying fatigue management strategies
- Read and interpret instructions, procedures, regulations and signs related to fatigue management and apply them to work activities
- Recognise symptoms of fatigue and take appropriate action in accordance with fatigue management regulations and workplace procedures
- Work collaboratively with others to manage and minimise the effects of fatigue during work activities
- Adjust lifestyle patterns to ensure effective fatigue management during work activities
- Modify activities and take appropriate initiatives to manage fatigue in the workplace depending on differing work contexts, risk situations and environments
- Apply precautions and required action to minimise and control the effects of fatigue when carrying out own work functions
- Adapt to changes in rosters and standard operating procedures as they may relate to fatigue management
- Participate in identifying and meeting own learning needs on matters related to fatigue management

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills, the range statement and the assessment guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria of this unit and include demonstration of applying:
 - the underpinning knowledge and skills
 - relevant legislation and workplace procedures
 - other relevant aspects of the range statement

Context of and specific resources for assessment

- Performance is demonstrated consistently over a period of time and in a suitable range of contexts
- Resources for assessment include:
 - a range of relevant exercises, case studies and

EVIDENCE GUIDE

- other/or simulated practical and knowledge assessment, and/or
- access to an appropriate range of relevant operational situations in the workplace
 - In both real and simulated environments, access is required to:
 - relevant and appropriate materials and/or equipment, and/or
 - applicable documentation including workplace procedures, regulations, codes of practice and operation manuals
- Method of assessment**
- Assessment of this unit must be undertaken by a registered training organisation
 - As a minimum, assessment of knowledge must be conducted through appropriate written/oral tests
 - Practical assessment must occur:
 - through activities in an appropriately simulated environment, and/or
 - in an appropriate range of situations in the workplace

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

- Workplace may include:
- any work environment requiring safety critical operational judgements to be made and in particular when operating equipment, vehicles, load shifting equipment, trains, marine vessels and aircraft at night
- The need for fatigue management in a range of industry situations including:
- operations conducted at all times but particularly at night
 - typical weather conditions
 - while working and/or driving at a workplace, depot, base or warehouse
 - while working and/or driving at a client's workplace or worksite
 - driving a motor vehicle on the open road
 - driving a motor vehicle on a private road
 - driving a train, locomotive or motive power unit
 - operating a marine vessel in coastal or international waters

RANGE STATEMENT

- Work-related factors that may contribute to fatigue include:
- operating an aircraft
 - operating load shifting equipment
 - operating safety critical industrial plant and equipment
 - work demands such as: workload, work duration, shift pattern, time of day, frequency and duration of breaks and the type of work (such as working in isolation, repetitive tasks and boring, monotonous or under-challenging tasks)
 - organisational factors such as: work environment (including temperature, ventilation, continual rhythmic vibration from equipment), payment system, trip and work scheduling, and the predictability of work
- Worker/operator-related factors that may contribute to fatigue include:
- lifestyle factors such as: sleep patterns, alcohol and drug use, quantity and timing of food and drink, and opportunities for relaxation with family and friends
 - working multiple jobs
 - personal or biological factors such as: state of mental and/or physical health, inadequate sleep, sleep disorders, emotional stress, family responsibilities, relationship difficulties, inadequate competence to complete work tasks, and circadian rhythms
- Responsibilities of individual for fatigue risk management may include:
- following the organisation's fatigue management policy and procedures
 - using time away from work appropriately to rest and recover
 - checking and ensuring fitness for work
 - reporting symptoms of fatigue
 - taking action to minimise risk when symptoms of fatigue are recognised
- Schedules may include:
- rosters
 - vehicle schedules
 - timetabling
 - workplans
- Depending on the organisation, operating procedures may include:
- standard operating procedures
 - company procedures
 - enterprise procedures
 - organisational procedures
 - established procedures
- Information and documents may include:
- federal and state/territory regulations and guidelines concerning fatigue management in various transport and workplace situations
 - workplace instructions and procedures on fatigue management

RANGE STATEMENT

- relevant OH&S regulations and procedures
 - work schedules and shift rosters
 - emergency procedures
 - log book or record book (where required)
 - records and reports of fatigue-related errors and safety incidents
 - relevant standards and certification requirements
 - quality assurance procedures
- Applicable legislation, regulations and codes may include:
- relevant regulations and codes of the federal government and the state/territory regulatory authorities concerning fatigue management
 - relevant state/territory road rules
 - relevant rail industry safe working codes and regulations (where applicable)
 - relevant state/territory permit regulations and requirements
 - relevant state/territory OH&S legislation

Unit Sector(s)

Not Applicable

Competency Field

Competency Field F - Safety Management

TLIF3063A Administer the implementation of fatigue management strategies

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

This unit involves the skills and knowledge required to administer the implementation of fatigue management strategies, including monitoring the implementation of fatigue management strategies; and recognising breaches of fatigue management policies, procedures and regulations. It also includes developing and assessing staff competence in fatigue management; providing feedback to staff on any shortcomings in their fatigue management skills and knowledge; and reporting to management on the implementation of fatigue management policy. Licensing, legislative, regulatory or certification requirements are applicable to this unit.

Application of the Unit

Application of the Unit

Persons achieving competence in this unit will need to fulfil the requirements of the applicable Commonwealth and state/territory legislation and relevant regulations covering the management of fatigue in the workplace.

Work is performed under limited supervision generally as a team leader or supervisor. It involves the application of relevant regulations and the principles of fatigue management when administering the implementation of an organisation's fatigue management strategies during work operations in a defined workplace.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Not Applicable

Employability Skills Information

Employability Skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Monitor the implementation of fatigue management strategies	<p>1.1 Work activities of employees, subcontractors and suppliers in the supply chain of products and services are monitored in accordance with the organisation's fatigue risk management implementation plan</p> <p>1.2 Reviews are undertaken of scheduled versus actual hours of work and where a compliance breach is identified, appropriate action is taken to analyse the reasons concerned and to rectify the situation</p>
2 Recognise breaches of fatigue management policies, procedures and regulations	<p>2.1 Signs and symptoms of fatigue in employees are identified in accordance with operational procedures</p> <p>2.2 Breaches of fatigue management policies, procedures and regulations in the work activities of employees, subcontractors and suppliers are recognised and reported as per standard procedures</p> <p>2.3 Errors and incidents traceable to non-compliance with fatigue management procedures and regulations are investigated and reported in accordance with operational procedures</p> <p>2.4 Appropriate action is taken in conjunction with employees, subcontractors or suppliers concerned to ensure ongoing and future compliance with the organisation's fatigue management policy and procedures</p>
3 Develop and assess staff competence in fatigue management	<p>3.1 Appropriate training programs and learning resources are developed and provided to ensure that employees understand the organisation's fatigue management policies and procedures and the risks, causes and consequences of fatigue</p> <p>3.2 Employees are assessed to confirm that they are competent in their understanding of the organisation's fatigue management strategies and can apply them to their day-to-day work activities and responsibilities</p> <p>3.3 Any deficiencies in the competence of individual employees to apply the organisation's fatigue management strategies to their work activities are identified, and appropriate learning opportunities are provided to the employee to enable her or him to achieve the competence required</p>
4 Provide feedback to employees on any shortcomings in fatigue management skills and knowledge	<p>4.1 Evidence of any shortcomings in an employee's implementation of fatigue management strategies is obtained and interpreted from observation of signs and symptoms of fatigue in their work activities, periodic evaluations of work performance, and assessments of competence carried out as part of training and learning activities</p> <p>4.2 Employees are provided with feedback on any identified shortcomings in their implementation of fatigue management</p>

ELEMENT	PERFORMANCE CRITERIA
5 Report on the implementation of fatigue management policy	<p>strategies and appropriate support and counselling is provided on how they might address these shortcomings</p> <p>4.3 Where appropriate, further learning opportunities and information are provided to the employees to assist them in implementation of organisation's fatigue management strategies in their area of work activity</p> <p>5.1 Periodic audits of the implementation of fatigue management strategies in the work areas of responsibility are carried out as per standard procedures</p> <p>5.2 Accidents and safety incidents are investigated and analysed to identify the extent to which fatigue might have been a contributing factor</p> <p>5.3 Reports on the implementation of the organisation's fatigue risk management system are prepared and submitted to designated personnel as per standard procedures</p>

Required Skills and Knowledge

REQUIRED KNOWLEDGE AND SKILLS

This describes the essential knowledge and skills and their level required for this unit.

Required knowledge:

- Relevant codes, regulations, permit and licence requirements related to fatigue management
- Relevant OH&S regulations as they relate to fatigue
- Organisation's fatigue risk management system as it relates to the operational areas being administered
- Organisation's fatigue risk management system and the workplace policies and procedures related to fatigue management and the control of factors that can contribute to fatigue and fatigue-related accidents
- Responsibilities of both the organisation and individual employees for the implementation of fatigue management regulations and policies in an organisation including suppliers and sub-contractors in the supply chain of the organisation's services and products
- Procedures for the auditing and review of an organisation's fatigue risk management system and related policy and procedures, and for reporting the outcomes of audits
- The risks and hazards created by fatigue in the workplace
- Causes and consequences of fatigue on both employees and an organisation
- How fatigue affects workplace performance
- How fatigue contributes to workplace accidents

REQUIRED KNOWLEDGE AND SKILLS

- Ways of recognising fatigue
- Strategies and ways of managing fatigue
- Factors which increase fatigue-related accidents
- Lifestyles which promote the effective long-term management of fatigue
- Ways of assisting individuals to assess their own sleep patterns and to evaluate their own fitness for work. This may include information on identifying sleep disorders and obtaining appropriate treatment
- Options and resources for providing training and learning opportunities for employees on fatigue management and the implementation of an organisation's fatigue risk management system, including initial induction training, in-depth training on fatigue and fatigue management techniques, remedial training where existing competence is assessed as being insufficient, and refresher training on fatigue management
- Processes and resources for assessing employees' competence in fatigue management
- Ways of providing feedback to employees on any identified deficiencies in their competence to implement fatigue management strategies

Required skills:

- Communicate effectively with others when implementing the organisation's fatigue risk management system
- Read and interpret documentation on an organisation's fatigue risk management system and related policy, instructions, procedures and regulations related to fatigue management and apply them to supervisory activities
- Recognise breaches of fatigue management strategies and regulations and take appropriate action in accordance with organisation's fatigue risk management system
- Work collaboratively with employees and other management staff others to implement the organisation's fatigue risk management system
- Plan and organise training and learning opportunities for employees on fatigue management and the implementation of an organisation's fatigue risk management system
- Plan and carry out audits and reviews of an organisation's fatigue risk management system
- Modify activities and take appropriate initiatives to administer the implementation of an organisation's fatigue risk management system depending on differing contexts, risk situations and environments
- Adapt to any changes in regulations policies and procedures as they may relate to fatigue management
- Assist employees to identify their own learning needs on matters related to fatigue management

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills, the range statement and the assessment guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- The evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria of this unit and include demonstration of applying:
 - the underpinning knowledge and skills
 - relevant legislation and workplace procedures
 - other relevant aspects of the range statement

Context of and specific resources for assessment

- Performance is demonstrated consistently over a period of time and in a suitable range of contexts
- Resources for assessment include:
 - a range of relevant exercises, case studies and/or other simulated practical and knowledge assessment, and/or
 - access to an appropriate range of relevant operational situations in the workplace
- In both real and simulated environments, access is required to:
 - relevant and appropriate materials and equipment, and
 - applicable documentation including workplace procedures, regulations, codes of practice and operation manuals

Method of assessment

- Assessment of this unit must be undertaken by a registered training organisation
- As a minimum, assessment of knowledge must be conducted through appropriate written/oral tests
- Practical assessment must occur:
 - through activities in an appropriately simulated environment at the registered training organisation, and/or
 - in an appropriate range of situations in the workplace

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Workplace may include:

- any work environment requiring safety critical operational judgements to be made and in particular when operating equipment, vehicles, load shifting equipment, trains, marine vessels and aircraft at night

Components of a fatigue risk management system include:

- risk management policy documents
- risk management procedures
- risk management competence assessment processes
- risk management training and learning opportunities
- hazard control system

The need for fatigue management in a range of industry situations including:

- operations conducted at all times but particularly at night
- typical weather conditions
- while working and/or driving at a workplace, depot, base or warehouse
- while working and/or driving at a client's workplace or work site
- driving a motor vehicle on the open road
- driving a motor vehicle on a private road
- driving a train, locomotive or motive power unit
- operating a marine vessel in coastal or international waters
- operating an aircraft
- operating load shifting equipment
- operating safety critical industrial plant and equipment

Work-related factors that may contribute to fatigue include:

- work demands such as: workload, work duration, shift pattern, time of day, frequency and duration of breaks and the type of work (e.g. working in isolation, repetitive tasks and boring, monotonous or under-challenging tasks)
- organisational factors such as: work environment (including temperature, ventilation, continual rhythmic vibration from equipment), payment system, trip and work scheduling, and the predictability of work

Worker/operator-related factors that may contribute to fatigue include:

- lifestyle factors such as: sleep patterns, alcohol and drug use, quantity and timing of food and drink, and opportunities for relaxation with family and friends
- working multiple jobs
- personal or biological factors such as: state of mental and/or physical health, inadequate sleep, sleep disorders, emotional stress, family responsibilities, relationship difficulties, inadequate competence to complete work tasks, and circadian rhythms

RANGE STATEMENT

Responsibilities of organisation for fatigue risk management may include:

- providing support such as: complying with fatigue management regulations, developing and implementing appropriate policy and procedures, providing assessment, training and learning opportunities, and establishing and implementing error and incident reporting systems
- ensuring work schedules provide adequate opportunity for rest and recovery between shifts
- assessing work tasks for fatigue related risk and redesigning if necessary
- managing fatigued employees

Responsibilities of individual for fatigue risk management may include:

- following the organisation's fatigue management policy and procedures
- using time away from work appropriately to rest and recover
- checking and ensuring fitness for work
- reporting symptoms of fatigue

Fatigue management competency-based training may include:

- initial induction training (incorporating a basic fatigue management component)
- fatigue management awareness training
- in-depth training on fatigue and fatigue management techniques
- remedial training where existing competence is assessed as being insufficient
- refresher training on fatigue management

Depending on the organisation operating procedures may include:

- standard operating procedures
- company procedures
- enterprise procedures
- organisational procedures
- established procedures

Information and documents may include:

- Commonwealth and state/territory regulations and guidelines concerning fatigue management in various transport and workplace situations
- fatigue risk management system documents
- workplace instructions and procedures on fatigue management
- reports of audits of fatigue risk management system
- error and safety incident reports
- relevant OH&S regulations and procedures
- relevant standards and certification requirements
- quality assurance procedures

Applicable legislation, regulations

- relevant regulations and codes of the Commonwealth Government and the state/territory roads and traffic

RANGE STATEMENT

and codes may include:

- authorities concerning fatigue management
- relevant state/territory road rules
- relevant rail industry safe working codes and regulations (where applicable)
- relevant state/territory permit regulations and requirements
- relevant state/territory OH&S legislation

Unit Sector(s)

Not Applicable

Competency Field

Competency Field F - Safety Management

TLILIC2001A Licence to operate a forklift truck

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor	This unit specifies the outcomes required for the operation of a powered industrial truck equipped with a mast and an elevating load carriage to which is attached a pair of fork arms or other attachment, for licensing purposes. This definition also includes a truck on which the operator is raised with the attachment for order-picking.
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Application of the Unit

Application of the Unit	<p>THIS UNIT REQUIRES THE OPERATOR TO BE ABLE PLAN THE WORK, CONDUCT ROUTINE CHECKS ON THE FORKLIFT, SHIFT LOADS IN A SAFE MANNER, AND SHUT DOWN AND SECURE THE EQUIPMENT AFTER THE COMPLETION OF OPERATIONS.</p> <p>This unit is based on the National Standard for Licensing Persons Performing High Risk Work.</p> <p>This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.</p>
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Not Applicable

Employability Skills Information

Employability Skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Not Applicable

Elements and Performance Criteria

ELEMENT <i>Elements describe the essential outcomes of a unit of competency.</i>	PERFORMANCE CRITERIA <i>Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.</i>
1. Plan work	1.1 Potential workplace hazards are identified 1.2 Hazard control measures are identified consistent with appropriate standards to ensure the safety of personnel and equipment 1.3 Appropriate forklift truck is selected according to the load and workplace conditions 1.4 Working area is inspected to determine appropriate path of movement for loads and forklift truck 1.5 Communication methods are identified according to procedures
2. Conduct routine checks	2.1 Forklift is visually checked for any damage or defects 2.2 All signage and labels are visible and legible according to the appropriate standard 2.3 All controls are located and identified 2.4 Pre-start operational checks are carried out according to procedures 2.5 Forklift is started according to procedures and checked for any abnormal noise 2.6 Post-start operational checks are carried out according to procedures 2.7 All forklift functions and safety devices are tested to their maximum according to procedures 2.8 Defects and damage are reported and recorded according to procedures , and appropriate action is taken
3. Shift load	3.1 The weight of load is assessed to ensure compliance with forklift truck data plate specifications 3.2 Appropriate hazard prevention/control measures are implemented and communicated with personnel in the work area 3.3 Forklift is operated at a safe speed and according to procedures 3.4 Loads are moved and placed to ensure stability of material and avoidance of hazards

	<p>3.5 Load movement is monitored constantly ensuring safety to personnel and load, and structural stability</p> <p>3.6 <i>Unplanned and/or unsafe situations</i> are responded to in line with <i>procedures</i></p>
4. Shut down and secure forklift truck	<p>4.1 <i>Forklift</i> truck is parked to avoid hazards</p> <p>4.2 Forklift is <i>shut down</i> according to <i>procedures</i></p> <p>4.3 Routine post-operational forklift checks are carried out according to <i>procedures</i></p> <p>4.4 Forklift is secured to prevent unauthorised access/use</p> <p>4.5 All defects and damage are reported and recorded according to <i>procedures</i>, and appropriate action is taken</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level required for this unit.

Required skills:

- Accurately interpret information relating to conducting forklift truck operations (e.g. procedures)
- Safely conduct forklift truck operations including all functions to the maximum height and load capacity
- Identify hazards associated with the operation of the forklift truck, assess risks and put into place effective hazard prevention/control measures for those hazards identified
- Use communication skills at a level sufficient to communicate with other site personnel (e.g. receive and interpret work instructions, safety information, emergency procedures)
- Drive forklift with load in forward and reverse, maintaining visibility
- Verify problems and equipment faults and demonstrate appropriate response procedures

Required knowledge:

- Methodology of determining the weight of a load
- Commonwealth, state or territory OH&S legislation, standards relevant to the safe operation for the forklift trucks
- Understanding of forklift characteristics and capabilities (including use of load data plates)
- Understanding of the hierarchy of hazard identification and control
- Organisational and workplace standards, requirements, policies and procedures for

REQUIRED SKILLS AND KNOWLEDGE

- conducting operations for the crane class
- Procedures for the recording, reporting and maintenance of workplace records and information
- Forklift truck operations and safe operating techniques
- Typical routine problems encountered in the operation of the crane and equipment and adjustments required for correction

Evidence Guide**EVIDENCE GUIDE**

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the assessment guidelines for the Training Package.

Overview of assessment

- Successful assessment of this unit meets the competency requirement of the National Standard for Licensing Persons Performing High Risk Work.
- State/territory OH&S regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for OH&S matters.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- Compliance with OH&S licensing legislation.
- Communicate and work safely with others in the work area.
- Identify hazards associated with the operation of the forklift truck and put in place effective hazard controls for those hazards identified.
- Conduct pre-start-up, operational, moving loads and shut down and secure checks of the forklift truck according to procedures.
- Operate the forklift truck and move loads safely, including driving and manoeuvring, picking up and placing of loads at various stack heights.
- Drive forklift truck with load in forward and reverse, maintaining visibility.

Context of and specific resources for assessment

- Assessment of the safe application of knowledge and skills to workplace tasks (performance) must be undertaken using the endorsed Assessment Instrument.

EVIDENCE GUIDE	
	<ul style="list-style-type: none"> • Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting. • Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints. • Applicants must have access to: <ul style="list-style-type: none"> • Personal Protective Equipment (PPE) for the purpose of the Performance Assessment • associated equipment appropriate to forklift truck operations • suitable loads as described by the endorsed Assessment Instrument • manufacturers specifications • appropriate forklift truck in a safe condition.
Method of assessment	<ul style="list-style-type: none"> • Assessment must be conducted using the endorsed Assessment Instrument. These Instruments provide instruction on their application. • The use of 'simulators' in the assessment of this unit of competency is not acceptable. • Assessment may be in conjunction with the assessment of other units of competency. • Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. • Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.
Guidance information for assessment	<ul style="list-style-type: none"> • Further information about endorsed Assessment Instruments may be obtained from state/territory OH&S regulators.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below.

RANGE STATEMENT	
Hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • ground conditions (e.g. condition of pavement, slopes) • overhead hazards (e.g. powerlines, service pipes) • insufficient lighting • traffic (e.g. pedestrians, vehicles, other plant) • weather (e.g. wind, lightning, rain) • forklift instability (e.g. overloading, poor load placement, irregular loads) • other hazards (e.g. dangerous materials)
Hazard control measures	<p>Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls</p> <p>It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk:</p> <ol style="list-style-type: none"> 1 elimination 2 substitution 3 isolation 4 engineering control measures 5 using safe work practices 6 personal protective equipment
Appropriate standards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • legislation • Australian standards • manufacturer's specifications • industry standards (where applicable)
Forklift truck	<p>May include but not be limited to:</p> <ul style="list-style-type: none"> • counterbalanced • reach trucks • rough terrain • internal combustion petrol, diesel, gas • electric
Communications methods	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • verbal and non-verbal language • written instructions • signage

RANGE STATEMENT	
	<ul style="list-style-type: none"> • hand signals • listening • questioning to confirm understanding • appropriate worksite protocol
Procedures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • manufacturer's guidelines (instructions, specifications or checklists) • industry operating procedures • workplace procedures (work instructions, operating procedures, checklists)
Pre-start operational checks	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • safety devices fitted where appropriate • forklift data plate fitted and interpreted • logbook, handbook or operating manuals available • external visual check including, evidence of damage, leaks, visual evidence of structural weaknesses (including paint separation or stressed welds) is carried out • forklift attachment is checked for security • approved modifications and/or attachments fitted to manufacturer's specifications (e.g. as per forklift or attachment data plate) are identified • checks for adaptations or modifications outside manufacturer's specifications (e.g. not listed on the forklift or attachment data plate) are carried out • maintenance logbook/records checked
Post-start operational checks	<p>May include checks of the forklift truck and equipment after start-up to ensure:</p> <ul style="list-style-type: none"> • hazard warning systems (for example lights and horns), are functional • attachment movements and control functions are smooth and comply with operating requirements • steering, transmission and brake functions comply with operating requirements
Hazard prevention/control measures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • barricades and traffic control • safety tags on electrical switches/isolators

RANGE STATEMENT	
	<ul style="list-style-type: none"> • insulated powerlines • safety observer used inside exclusion zone • disconnected power • pedestrian control (barricades, signs, etc.) • excavation safeguards • movement of obstructions • personal protective equipment • adequate illumination
Unplanned and/or unsafe situations	<p>May include but not limited:</p> <ul style="list-style-type: none"> • failure/loss of control (e.g. brakes and steering) • failure of equipment (e.g. hydraulic system) • environmental condition
Shut down	<p>May include, but is not limited to:</p> <ul style="list-style-type: none"> • parking in a suitable location away from dangerous areas • fork arms are correctly positioned (tips down, tilted forward, lowered to ground) • appropriate transmission/gear is selected for parking (relevant to transmission type) • hand/parking brake is applied • engine power is turned off • ignition key is removed (if applicable) • LPG gas cylinder valve is shut off (where fitted) • securing equipment against unauthorised operation • securing the site • ensuring access ways are clear • identifying and segregating defective equipment and reporting to authorised personnel • batteries are connected to the charger (if applicable)

Unit Sector(s)

Not Applicable

TLILIC2015B Licence to drive a medium rigid vehicle

Modification History

NEw release. THis unit replaces and is equivalent to TLILIC2015A.

Unit Descriptor

This unit involves the skills and knowledge required to obtain a licence to drive a medium rigid vehicle. It includes systematically and efficiently controlling all vehicle functions, monitoring traffic and road conditions, managing vehicle condition and performance, and effectively managing hazardous situations.

Assessment of this unit will be undertaken within a licensing examination conducted by, or under the authority of, the relevant state/territory driver licensing authority.

Application of the Unit

This unit applies to driving that is carried out in compliance with the licence requirements and regulations of the relevant state/territory driver licensing authority pertaining to medium rigid vehicles.

Driving is performed with limited or minimum supervision, and with limited accountability and responsibility for self and others in achieving the prescribed outcomes.

Driving involves the application of routine vehicle driving principles and procedures to maintain safety and operate a medium rigid vehicle across a variety of driving contexts.

The primary legislative requirements applicable to this unit of competency are state/territory legislation in relation to road use and driver licensing.

This unit addresses the knowledge and skills necessary for the granting of a Medium Rigid Driver Licence.

Being awarded this unit of competency is a necessary requirement to obtain a Medium Rigid Driver Licence but is only one of several criteria. Prospective licence applicants should check with the state/territory driver licensing authority for other criteria (such as licence tenure and medical fitness) to confirm compliance with other eligibility requirements before undertaking training and/or assessment.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

- | | |
|---|--|
| 1 Drive a medium rigid vehicle | <p>1.1 Medium rigid vehicle is started, steered, manoeuvred, positioned and stopped according to traffic regulations, manufacturer instructions and relevant vehicle handling procedures</p> <p>1.2 Engine power is managed to ensure efficiency and performance, and to minimise engine and transmission damage</p> <p>1.3 Braking system of medium rigid vehicle is managed and operated efficiently to ensure effective control of vehicle under all conditions</p> <p>1.4 Driving hazards are identified and/or anticipated and avoided or controlled through defensive driving</p> <p>1.5 Medium rigid vehicle is driven in reverse, maintaining visibility and achieving accurate positioning</p> <p>1.6 Medium rigid vehicle is parked, shutdown and safely secured according to traffic regulations</p> <p>1.7 Load is safely and effectively restrained</p> |
| 2 Monitor traffic and road conditions | <p>2.1 Traffic and road conditions are constantly monitored and acted upon to enable safe operation and ensure no injury to people or damage to property, equipment, loads and facilities</p> <p>2.2 Interaction with other road users is conducted courteously according to road rules to ensure safe and efficient traffic flow</p> |
| 3 Monitor and maintain vehicle performance | <p>3.1 Vehicle performance is maintained through pre-operational inspections and vehicle checks</p> <p>3.2 Appropriate signage, lights and equipment are checked for operational effectiveness and for conformity to prescribed traffic regulations</p> |

Required Skills and Knowledge

This section describes the knowledge and skills required for this unit.

Required knowledge:

- Driving hazards and related defensive driving techniques
- Efficient driving techniques
- Engine power management and safe driving strategies
- Medium rigid vehicle controls, instruments and indicators and their use
- Medium rigid vehicle handling procedures
- Pre-operational checks carried out on vehicle and related action
- Relevant state/territory driver licensing authority road rules, regulations, permit and licence requirements

Required skills:

- Anticipate and monitor and traffic hazards and take appropriate action
- Apply precautions and required action to eliminate, minimise or control hazards that may exist when driving a medium rigid vehicle
- Carry out pre-operational vehicle checks
- Communicate effectively with others when driving a medium rigid vehicle
- Read and interpret instructions, procedures, information and signs relevant to driving a medium rigid vehicle

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills, the range statement and the assessment guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

The evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the Elements, Performance Criteria, Required Skills, Required Knowledge and include:

- applying relevant procedures that reflect legislative requirements
- negotiating a range of complex traffic infrastructure (such as roundabouts, traffic lights, stalemate intersections, railway level crossings).

Context of and specific resources for assessment

Resources for assessment include access to:

- range of relevant exercises, case studies and/or other simulated practical and knowledge assessment
- appropriate range of relevant on-road operational situations or in the workplace
- relevant and appropriate materials and equipment
- applicable documentation such as workplace procedures, regulations, codes of practice and operation manuals.

Method of assessment

Practical driving aspects must be assessed in a vehicle typical of the class as approved by the state/territory driver licensing authority. The use of simulators for driver testing is not permitted.

The assessor must use the mandatory assessment tool provided by the state/territory driver licensing authority to conduct the assessment for this unit according to licensing authority requirements.

The state/territory driver licensing authority may prescribe approved routes, which must be used for the final assessment.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Medium rigid vehicle includes:

- Two axle rigid truck, not being a prime mover, above 8 tonnes GVM

Vehicle handling procedures may include:

- Two axle bus above 8 tonnes GVM
- Accelerating and braking
- Managing engine performance
- Operating vehicle controls, instruments and indicators
- Positioning and stopping a vehicle
- Reversing a vehicle
- Starting a vehicle
- Steering and manoeuvring a vehicle
- Using defensive driving techniques

Driving hazards may include:

- Animals and objects on road
- Faulty:
 - brakes
 - steering mechanism on vehicle
- Fire in vehicle
- Flooded sections of road
- Foggy conditions
- Leaking fuel
- Oil on road
- Parked vehicles on road
- Pedestrians crossing road
- Wet and iced roads
- Windy sections of road

Traffic and road conditions may include:

- Negotiating a range of more complex traffic infrastructure (such as roundabouts, traffic lights, stalemate intersections, railway level crossings)
- On open or private roads including roads with moderate inclines and declines
- Operations conducted during the day or night
- Typical weather conditions
- While at a depot, base or warehouse
- While at a client workplace or work site

Pre-operational inspections and equipment checks may include:

- Checking and topping up fluid levels
- Checking:
 - brakes
 - operation of vehicle lights and indicators
 - tyre pressures

- Visually checking vehicle

Unit Sector(s)

Not applicable.

Competency Field

LIC - Licensing

TLILIC2016B Licence to drive a heavy rigid vehicle

Modification History

New release. This unit replaces and is equivalent to TLILIC2016A.

Unit Descriptor

This unit involves the skills and knowledge required to obtain a licence to drive a heavy rigid vehicle. It includes systematically and efficiently controlling all vehicle functions, monitoring traffic and road conditions, managing vehicle condition and performance, and effectively managing hazardous situations.

Assessment of this unit will be undertaken within a licensing examination conducted by, or under the authority of, the relevant state/territory driver licensing authority.

Application of the Unit

This unit applies to driving that is carried out in compliance with the licence requirements and regulations of the relevant state/territory driver licensing authority pertaining to heavy rigid vehicles.

Driving is performed with limited or minimum supervision, and with limited accountability and responsibility for self and others in achieving the prescribed outcomes.

Driving involves the application of routine vehicle driving principles and procedures to maintain safety and operate a heavy rigid vehicle across a variety of driving contexts.

The primary legislative requirements applicable to this unit of competency are state/territory legislation in relation to road use and driver licensing.

This unit addresses the knowledge and skills necessary for the granting of a Heavy Rigid Driver Licence.

Being awarded this unit of competency is a necessary requirement to obtain a Heavy Rigid Driver Licence but is only one of several criteria. Prospective licence applicants should check with the state/territory driver licensing authority for other criteria (such as licence tenure and medical fitness) to confirm compliance with other eligibility requirements before undertaking training and/or assessment.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

- | | |
|---|---|
| 1 Drive a heavy rigid vehicle | <ul style="list-style-type: none">1.1 Heavy rigid vehicle is started, steered, manoeuvred, positioned and stopped according to traffic regulations, manufacturer instructions and relevant vehicle handling procedures1.2 Engine power is managed to ensure efficiency and performance, and to minimise engine and gear damage1.3 Braking system of heavy rigid vehicle is managed and operated efficiently to ensure effective control of vehicle under all conditions1.4 Driving hazards are identified and/or anticipated and avoided or controlled through defensive driving1.5 Heavy rigid vehicle is driven in reverse, maintaining visibility and achieving accurate positioning1.6 Heavy rigid vehicle is parked, shutdown and safely secured according to traffic regulations1.7 Load is safely and effectively restrained |
| 2 Monitor traffic and road conditions | <ul style="list-style-type: none">2.1 Traffic and road conditions are constantly monitored and acted upon to enable safe operation and to ensure no injury to people or damage to property, equipment, loads and facilities2.2 Interaction with other road users is conducted courteously according to road rules to ensure safe and efficient traffic flow |
| 3 Monitor and maintain vehicle performance | <ul style="list-style-type: none">3.1 Vehicle performance is maintained through pre-operational inspections and vehicle checks3.2 Appropriate signage, lights and equipment are checked for operational effectiveness and for conformity to prescribed traffic regulations |

Required Skills and Knowledge

This section describes the knowledge and skills required for this unit.

Required knowledge:

- Driving hazards and related defensive driving techniques
- Efficient driving techniques
- Engine power management and safe driving strategies
- Heavy rigid vehicle controls, instruments and indicators and their use
- Heavy rigid vehicle handling procedures
- Pre-operational checks carried out on vehicle and related action
- Relevant state/territory driver licensing authority road rules, regulations, permit and licence requirements

Required skills:

- Anticipate and monitor and traffic hazards and take appropriate action
- Apply precautions and required action to eliminate, minimise or control hazards that may exist when driving a heavy rigid vehicle
- Carry out pre-operational vehicle checks
- Communicate effectively with others when driving a heavy rigid vehicle
- Read and interpret instructions, procedures, information and signs relevant to driving a heavy rigid vehicle

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills, the range statement and the assessment guidelines for this Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

The evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the Elements, Performance Criteria, Required Skills, Required Knowledge and include:

- applying relevant procedures that reflect legislative requirements
- negotiating a range of complex traffic infrastructure (such as roundabouts, traffic lights, stalemate intersections, railway level crossings).

Context of and specific resources for assessment

Resources for assessment include access to:

- range of relevant exercises, case studies and/or other simulated practical and knowledge assessment
- appropriate range of relevant on-road operational situations or in the workplace
- relevant and appropriate materials and equipment
- applicable documentation such as workplace procedures, regulations, codes of practice and operation manuals.

Method of assessment

Practical driving aspects must be assessed in a vehicle typical of the class as approved by the state/territory driver licensing authority. The use of simulators for driver testing is not permitted.

The assessor must use the mandatory assessment tool provided by the state/territory driver licensing authority to conduct the assessment for this unit according to licensing authority requirements.

The state/territory driver licensing authority may prescribe approved routes, which must be used for the final assessment.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

- Heavy rigid vehicle includes:
- Rigid vehicle, not being an unladen prime mover, with a minimum of three axles and a minimum 15 tonnes GVM
 - Modified three axle prime mover with a certified detachable tray (with capacity to carry 75% of its specified GVM) with a GVM of 15 tonnes
 - Three axle articulated bus
 - Three axle bus above 15 tonnes GVM
- Vehicle handling procedures may include:
- Accelerating and braking
 - Managing engine performance
 - Operating vehicle controls, instruments and indicators
 - Positioning and stopping a vehicle
 - Reversing a vehicle
 - Starting a vehicle
 - Steering and manoeuvring a vehicle
 - Using defensive driving techniques
- Driving hazards may include:
- Animals and objects on road
 - Faulty:
 - brakes
 - steering mechanism on vehicle
 - Fire in vehicle
 - Flooded sections of road
 - Foggy conditions
 - Leaking fuel
 - Oil on road
 - Parked vehicles on road
 - Pedestrians crossing road
 - Wet and iced roads
 - Windy sections of road
- Traffic and road conditions may include:
- Negotiating a range of more complex traffic infrastructure (such as roundabouts, traffic lights, stalemate intersections, railway level crossings)
 - On open or private roads including roads with moderate inclines and declines
 - Operations conducted during the day or night
 - Typical weather conditions
 - While at a depot, base or warehouse
 - While at a client workplace or worksite
- Pre-operational inspections
- Checking and topping up fluid levels

and equipment checks may include:

- Checking:
 - brakes
 - operation of vehicle lights and indicators
 - tyre pressures
- Visually checking vehicle

Unit Sector(s)

Not applicable.

Competency Field

LIC - Licensing

TLILIC4011A Licence to operate a slewing mobile crane (over 100 tonnes)

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor	This unit specifies the outcomes required to operate a slewing mobile crane (over 100 tonnes) for licensing purposes. It encompasses the requirement for the up to 100 tonnes licence.
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Application of the Unit

Application of the Unit	<p>This unit requires the operator to plan the work, conduct routine checks, set up crane, transfer loads, mobile loads and shut down and secure the crane.</p> <p>This unit is based on the requirements of the National Standard for Licensing Persons Performing High Risk Work.</p> <p>This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit, which is not acceptable to regulators for the purpose of licensing.</p>
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Not Applicable

Employability Skills Information

Employability Skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

<i>Elements describe the essential outcomes of a unit of competency</i>	<i>Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.</i>
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan work	<p>1.1 Potential workplace hazards are identified</p> <p>1.2 Hazard control measures are identified consistent with appropriate standards to ensure the safety of personnel and equipment</p> <p>1.3 The weight of the load is identified and estimated in consultation with associated personnel</p> <p>1.4 Crane is appropriate to the load/s and workplace conditions</p> <p>1.5 Appropriate paths for the movement of loads in the work area is inspected and determined</p> <p>1.6 Appropriate communication methods are identified with associated personnel</p>
2. Conduct routine checks	<p>2.1 Crane is visually checked for any damage or defects</p> <p>2.2 Crane is accessed in a safe manner</p> <p>2.3 All signage and labels are visible and legible according to the appropriate standard</p> <p>2.4 Routine pre-operational crane checks are carried out according to procedures</p> <p>2.5 All controls are located and identified</p> <p>2.6 Crane service logbook is checked for compliance</p> <p>2.7 Crane is started according to procedures and checked for any abnormal noises</p> <p>2.8 All crane safety devices are tested according to procedures</p> <p>2.9 Post-start operational checks are carried out according to procedures</p> <p>2.10 All communication equipment is checked for serviceability</p> <p>2.11 All damage and defects are reported and recorded according to procedures, and appropriate action is taken</p>
3. Set up crane	<p>3.1 Ground suitability is checked</p> <p>3.2 Crane is driven to the work area according to procedures</p> <p>3.3 Crane is positioned for work application and stability according to procedures</p> <p>3.4 Appropriate crane configuration for work task is</p>

ELEMENT	PERFORMANCE CRITERIA
	<p>determined according to <i>procedures</i> (where applicable)</p> <p>3.5 Boom/jib and counterweight configuration data is input into the crane computer (as required)</p> <p>3.6 Appropriate <i>hazard prevention/control measures</i> are applied to the work area according to <i>procedures</i></p> <p>3.7 All <i>communications equipment</i> is tested for functionality</p>
4. Transfer load	<p>4.1 Lifts are determined within the capacity of the crane</p> <p>4.2 Boom/jib and hoist block is positioned over load following directions from <i>associated personnel</i></p> <p>4.3 <i>Test lift</i> is carried out according to <i>procedures</i></p> <p>4.4 Loads are transferred using all <i>relevant crane movements</i> according to <i>procedures</i> and the <i>appropriate standard</i></p> <p>4.5 All required <i>communication signals</i> are correctly interpreted according to <i>procedures</i> and the <i>appropriate standard</i></p> <p>4.6 <i>Crane</i> is operated according to <i>procedures</i></p> <p>4.7 Load movement is monitored constantly ensuring safety to personnel and load, and crane stability</p> <p>4.8 <i>Unplanned and/or unsafe</i> situations are responded to in line with <i>procedures</i></p>
5. Mobile load	<p>5.1 Suitability of <i>planned route</i> is checked for the crane according to <i>procedures</i></p> <p>5.2 <i>Crane</i> is configured to mobile load according to <i>procedures</i></p> <p>5.3 Load is moved using <i>best mobile practice</i> according to the <i>appropriate standard</i></p>
6. Shut down and secure crane	<p>6.1 Crane boom/jib and equipment are stowed and secured where appropriate according to <i>procedures</i> and the <i>appropriate standard</i></p> <p>6.2 Relevant motion locks and brakes are applied (where applicable)</p> <p>6.3 Outriggers/stabilisers are stowed and secured according to <i>procedures</i></p> <p>6.4 Crane is <i>shut down</i> according to <i>procedures</i></p> <p>6.5 Plates or packing are stowed and secured</p> <p>6.6 Routine post-operational crane checks are carried out according to <i>procedures</i></p> <p>6.7 All damage and defects are reported and recorded</p>

ELEMENT	PERFORMANCE CRITERIA
	according to <i>procedures</i> , and appropriate action is taken

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level required for this unit.

Required skills:

- Accurately record and maintain information relating to crane operations
- Use communication techniques in the workplace including whistles, hand signals and use of two-way radios
- Use interpersonal communication skills at a level sufficient to communicate with other site personnel
- Load data into crane computer (where fitted) and check operation to accurately reflect the crane configuration
- Operate a slewing mobile crane (over 100 tonnes capacity) for the lifting and moving of loads to the safe working rated capacity in conjunction with other associated personnel
- Apply risk assessment and hazard control strategies, including hierarchy of control as applied to the positioning and safe operation of the crane (particular awareness of the risks associated with overhead powerlines/electrical cables, wind, erection, pack up and crane stability)
- Use and interpret crane manufacturer's specifications and data, including load charts, to enable the crane to be configured for the load
- Verify problems and equipment faults and demonstrate appropriate response procedures

Required knowledge:

- Appropriate mathematical procedures for estimation and measurement of loads
- Commonwealth, state or territory OH&S legislation, standards and codes of practice relevant to the full range of processes for the crane class
- Level of literacy to be able to read and comprehend manufacturer's instructions, procedures and safety signs
- Mobile slewing crane characteristics and capabilities to allow the configuration of the crane to suit the range of loads
- Mobile slewing crane operating techniques
- Understanding of the hierarchy of hazard identification and control
- Organisational and workplace standards, requirements, policies and procedures for conducting operations for the crane class

REQUIRED SKILLS AND KNOWLEDGE

- Procedures for the recording, reporting and maintenance of workplace records and information
- Rated capacity and working load limits (including use of crane load charts)
- Typical routine problems encountered in the process and with equipment and adjustments required for correction

Evidence Guide**EVIDENCE GUIDE**

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the assessment guidelines for the Training Package.

Overview of assessment

- Successful assessment of this unit meets the competency requirement of the National Standard for Licensing Persons Performing High Risk Work.
- State/territory OH&S regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for OH&S matters.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- Compliance with OH&S licensing legislation.
- Effectively communicate and work safely with others in the work area.
- Risk assessment and management procedures (particular awareness of the risks associated with overhead powerlines/electrical cables, ground conditions, crane tipping and demolition sites).
- Effectively complete the pre-operational check, positioning, stabilising, set up, operation, post-operational checks of a mobile crane including all functions to their maximum extension in the lifting and moving of loads to the safe working rated capacity of the mobile crane over 100 tonne capacity in conjunction with other associated personnel.
- Appropriate mathematical procedures for estimation of loads.

Context of and specific resources for assessment

- Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the endorsed Assessment Instrument.
- Assessment of performance must be undertaken

EVIDENCE GUIDE	
	<p>either in the workplace or in a realistically simulated workplace setting.</p> <ul style="list-style-type: none"> Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace. Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints. Assessment is to comply with relevant appropriate standard requirements. Applicants must have access to: <ul style="list-style-type: none"> Personal Protective Equipment (PPE) for the purpose of the Performance Assessment appropriate slewing mobile crane (over 100tonne) and associated equipment in safe condition suitable loads as specified by the endorsed Assessment Instrument communication equipment (e.g. two-way radios, whistles, etc.) other associated personnel to sling and direct the loads.
Method of assessment	<ul style="list-style-type: none"> Assessment must be conducted using the endorsed Assessment Instruments. These Instruments provide advice on their application. The use of 'simulators' in the assessment of this unit of competency is not acceptable. Assessment may be in conjunction with the assessment of other units of competency. Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstances, but is able to be transferred to other circumstances.
Guidance information for assessment	<ul style="list-style-type: none"> Further information about endorsed Assessment Instruments may be obtained from state/territory OH&S regulators.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below.

Hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • ground stability (e.g. ground condition, recently filled trenches, slopes) • overhead hazards (e.g. powerlines, service pipes) • traffic (e.g. pedestrians, vehicles, other plant) • insufficient lighting • environmental conditions (e.g. wind, lightning, storms, etc.) • other specific hazards (e.g. dangerous materials)
Hazard control measures	<p>Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls</p> <p>It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk:</p> <ol style="list-style-type: none"> 1 elimination 2 substitution 3 isolation 4 engineering control measures 5 using safe work practices 6 personal protective equipment
Appropriate standard	<p>May include:</p> <ul style="list-style-type: none"> • codes of practice (mobile crane) • legislation • Australian standards • manufacturer's specifications • industry standards (where applicable)
Associated personnel	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • riggers • doggers
Appropriate	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • crane capabilities

RANGE STATEMENT	
	<ul style="list-style-type: none"> environmental conditions (e.g. wind, lightning, storms, etc.)
Crane	<p>May include a boom or jib, which is capable of being slewed (over 100 tonnes capacity)</p> <p>The slewing mobile crane over 100 tonnes classification encompasses the requirements for the slewing mobile crane up to 100 tonnes classification</p>
Communication method	<p>May include but not limited to:</p> <ul style="list-style-type: none"> verbal and non-verbal language written instructions signage hand signals listening questioning to confirm understanding appropriate worksite protocol
Signage and labels	<p>May include but not limited to:</p> <ul style="list-style-type: none"> crane data plates/labels load charts crane decals control labels
Procedures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> manufacturer's guidelines (instructions, specifications or checklists) industry operating procedures workplace procedures (work instructions, operating procedures, checklists)
Controls	<p>May include but not limited to:</p> <ul style="list-style-type: none"> luffing levers hoisting and lowering levers slewing levers including brake boom extension levers (where fitted)
Service logbook	<p>May include but not limited to:</p> <ul style="list-style-type: none"> any logbook service book history record system where the service and maintenance history is kept

RANGE STATEMENT	
Crane safety devices	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • horns/sirens • audible and visual reversing devices • operator restraint devices • lights
Communication equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • two-way radios • whistles • bells • buzzers <p>NB: where radio communication equipment is used the transmitting frequencies of the equipment must be selected to prevent interference to or from other radio equipment being used in the vicinity of the crane</p>
Ground suitability	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • rough uneven ground • backfilled ground • soft soils • hard compacted soil • rock • bitumen • concrete
Stability	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • deploying outriggers • establishing correct size plates or packing • correctly positioning plates or packing
Crane configuration	<p>May include but not be limited to:</p> <ul style="list-style-type: none"> • boom/jib • fly-jib • counterweights
Hazard prevention/control measures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • safety tags on electrical switches/isolators • insulated powerlines • safety observer used inside exclusion zone • disconnected power • traffic barricades and control

RANGE STATEMENT	
	<ul style="list-style-type: none"> • pedestrian barricades • trench covers • movement of obstructions • personal protective equipment • adequate illumination
Test lift	<p>The load is lifted just clear of the lifting plane to allow for checks to be safely made in consultation with associated personnel to ensure that:</p> <ul style="list-style-type: none"> • near capacity loads do not overload the crane • loads of unusual shape or weight distribution are correctly slung • load measuring equipment can be used to verify the calculated weight of the load • all crane equipment is functioning properly • adjustments to the slinging can be made in a safe manner
Relevant crane movements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • telescope in and out • jib up and down • slew jib • operation of outriggers/stabilisers • raise and lower hoist • travel
Communication signals	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • stop - hand • stop - whistle • hoist up - hand • hoist up - whistle • hoist down - hand • hoist down - whistle • luff boom down - hand • luff boom down - whistle • luff boom up - hand • luff boom up - whistle • telescope out - hand • telescope out - whistle • telescope in - hand • telescope in - whistle • slew left - hand

RANGE STATEMENT	
	<ul style="list-style-type: none"> • slew left - whistle • slew right - hand • slew right - whistle • travel - hand
Unplanned and/or unsafe situations	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • failure/loss of control (e.g. brakes and steering) • failure of equipment (e.g. hydraulic system) • environmental conditions (e.g. wind, lightning, storms, etc.)
Planned route	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • unusual or difficult terrains • obstacles or obstruction
Best mobile practice	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • minimum speed • gentle acceleration and braking (to minimise load swing) • minimum boom/jib length • carrying the load near to the ground surface • boom/jib in line with the crane • boom/jib as low as possible • load faces uphill • use of handheld taglines
Shut down	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • retracting boom/jib • retracting hoist rope and hook block • positioning/securing boom/jib for transport • retracting outriggers/stabilisers • idling engine to stabilise temperature • turning off engine (where applicable) • removing key from ignition (where applicable) • locking and securing cabin (where applicable) • securing crane for travel

Unit Sector(s)

Not Applicable

TLILIC0012A Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above)

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor	This unit specifies the outcomes required to operate a vehicle loading crane with a capacity of 10 metre tonnes or more, mounted on a vehicle for the principle purpose of loading and unloading such a vehicle, including the application of load estimation and slinging techniques to move a load, for licensing purposes.
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Application of the Unit

Application of the Unit	<p>This unit requires the operator to plan the work, conduct routine checks, set up crane, transfer loads and shut down and secure crane.</p> <p>This unit is based on the requirements of the National Standard for Licensing Persons Performing High Risk Work.</p> <p>This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.</p>
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Not Applicable

Employability Skills Information

Employability Skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

<i>Elements describe the essential outcomes of a unit of competency</i>	<i>Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.</i>
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan work	1.1 Potential workplace <i>hazards</i> are identified 1.2 <i>Hazard control measures</i> are identified consistent with <i>appropriate standards</i> to ensure the safety of personnel and equipment 1.3 The weight of the load is identified and estimated in consultation with <i>associated personnel</i> (where applicable) 1.4 Suitable lifting points on the load are identified in consultation with <i>associated personnel</i> 1.5 Appropriate <i>lifting equipment</i> is obtained following consultation with <i>associated personnel</i> 1.6 <i>Crane</i> is <i>appropriate</i> to the load/s and workplace conditions 1.7 Appropriate paths for the movement of loads in the work area are inspected and determined 1.8 Appropriate <i>communication methods</i> are identified with <i>associated personnel</i>
2. Conduct routine checks	2.1 <i>Crane</i> is visually checked for any damage or defects 2.2 All <i>signage and labels</i> are visible and legible according to the <i>appropriate standard</i> . 2.3 Routine pre-operational crane checks are carried out according to <i>procedures</i> 2.4 All <i>controls</i> are located and identified 2.5 Crane <i>service logbook</i> is checked for compliance 2.6 <i>Crane</i> is started according to <i>procedures</i> and checked for any abnormal noises 2.7 All crane <i>safety devices</i> are tested according to <i>procedures</i> 2.8 Post-start operational checks are carried out according to <i>procedures</i> 2.9 All <i>communication equipment</i> is checked for serviceability 2.10 All damage and defects are reported and recorded according to <i>procedures</i> , and appropriate action is taken
3. Set up crane	3.1 <i>Ground suitability</i> is checked 3.2 <i>Crane</i> is driven to the work area according to <i>procedures</i> 3.3 <i>Crane</i> is positioned for work application and <i>stability</i> according to <i>procedures</i>

ELEMENT	PERFORMANCE CRITERIA
	<p>3.4 Boom/jib and configuration data is input into the crane computer (as required)</p> <p>3.5 Appropriate <i>hazard prevention/control measures</i> are applied to the work area according to <i>procedures</i></p> <p>3.6 All <i>communications equipment</i> is tested for functionality</p> <p>3.7 <i>Lifting equipment</i> is prepared for load according to <i>procedures</i></p> <p>3.8 <i>Load destination</i> is prepared</p>
<p>4. Transfer loads</p>	<p>4.1 Loads are determined within the capacity of the crane</p> <p>4.2 Boom/jib and hoist block is positioned over load following directions from <i>associated personnel</i></p> <p>4.3 <i>Lifting equipment</i> is attached and secured using <i>defined techniques</i> according to <i>procedures</i></p> <p>4.4 <i>Test lift</i> is carried out according to <i>procedures</i></p> <p>4.5 Loads are transferred using all <i>relevant crane movements</i> according to <i>procedures</i> and the <i>appropriate standard</i></p> <p>4.6 All required <i>communication signals</i> are correctly interpreted according to <i>procedures</i> and the <i>appropriate standard</i></p> <p>4.7 The load is landed ensuring stability and security from movement</p> <p>4.8 <i>Lifting equipment</i> is removed or disconnected from load and/or lifting hook according to <i>procedures</i> (where applicable)</p> <p>4.9 <i>Crane</i> is operated according to <i>procedures</i></p> <p>4.10 Load movement is monitored constantly ensuring safety to personnel and load, and crane stability</p> <p>4.11 <i>Unplanned and/or unsafe</i> situations are responded to in line with <i>procedures</i></p>
<p>5. Shut down and secure crane</p>	<p>5.1 <i>Crane</i> boom/jib and equipment are stowed and secured according to <i>procedures</i> and the <i>appropriate standard</i></p> <p>5.2 Relevant motion locks and brakes are applied (where applicable)</p> <p>5.3 Outriggers/stabilisers are stowed and secured according to <i>procedures</i></p> <p>5.4 Plates or packing are stowed and secured.</p>

ELEMENT	PERFORMANCE CRITERIA
	5.5 <i>Crane is shut down</i> according to <i>procedures</i> 5.6 Routine post-operational crane checks are carried out according to <i>procedures</i> 5.7 <i>Lifting equipment</i> is stored according to <i>procedures</i> and the <i>appropriate standards</i> 5.8 All damage and defects are reported and recorded according to <i>procedures</i> , and appropriate action is taken

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE
<p><i>This describes the essential skills and knowledge and their level required for this unit.</i></p>
<p>Required skills:</p>
<ul style="list-style-type: none"> • Accurately record and maintain information relating to crane operations • Use communication techniques in the workplace including hand signals, whistles and two-way radios • Use interpersonal communication skills at a level sufficient to communicate with other site personnel • Operate crane including all functions to their maximum extension in the loading and unloading of loads to the safe working rated capacity of the crane, in conjunction with other associated personnel • Use of lifting equipment and basic slinging techniques suitable for the loads to be loaded/unloaded as defined by workplace procedures • Apply risk assessment and hazard control strategies, including hierarchy of control as applied to the positioning and safe operation of the vehicle loading crane (particular awareness of the risks associated with overhead powerlines/electrical cables, ground conditions and vehicle tipping) • Use and interpret crane manufacturer's specifications and data, including load charts to enable the vehicle loading crane to be configured for the load • Verify problems and equipment faults and demonstrate appropriate response procedures
<p>Required knowledge:</p>
<ul style="list-style-type: none"> • Appropriate mathematical procedures for estimation of loads • Assessment of ground conditions to confirm that the site is suitable (e.g. firm, level and safe) to operate the crane • Awareness of the boom/jib movements and particularly the safe positioning of the operator for any lift

REQUIRED SKILLS AND KNOWLEDGE

- Commonwealth, state or territory OH&S legislation, standards and codes of practice relevant to the full range of processes for the crane class
- Use of lifting equipment and basic slinging techniques suitable for the loads to be loaded/unloaded as defined by workplace procedures
- Understanding of the hierarchy of hazard identification and control
- Level of literacy to be able to read and comprehend manufacturer's instructions, procedures and safety signs
- Organisational and workplace standards, requirements, policies and procedures for conducting operations for the crane class
- Procedures for the recording, reporting and maintenance of workplace records and information
- Typical routine problems encountered in the process and with equipment and adjustments required for correction
- Crane characteristics and capabilities to allow the configuration of the crane to suit the range of loads

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the assessment guidelines for the Training Package.

Overview of assessment

- Successful assessment of this unit meets the competency requirement of the National Standard for Licensing Persons Performing High Risk Work.
- State/territory OH&S regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for OH&S matters.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- Compliance with OH&S licensing legislation.
- Communicate and work safely with others in the work area.
- Assessment of ground conditions to confirm that the site is suitable (e.g. firm, level and safe) to operate the vehicle loading crane.
- Risk assessment and hazard control strategies, including hierarchy of control as applied to the positioning and safe operation of the vehicle loading crane (particular awareness of the risks associated with overhead powerlines/electrical cables, ground

EVIDENCE GUIDE	
	<p>conditions, wind, pedestrians and tipping).</p> <ul style="list-style-type: none"> • Set up, position stabilise and operate a vehicle loading crane including all functions to their maximum extension in the loading and unloading of loads to the safe working rated capacity. • Move loads from the vehicle to the ground and/or ground to the vehicle as described in the endorsed assessment tool. • Appropriate mathematical procedures for estimation of loads. • Use of lifting equipment and basic slinging techniques suitable for the loads to be loaded/unloaded as defined in the workplace procedures. • Awareness of the boom/jib movements and particularly the safe positioning of the operator for any lift.
<p>Context of and specific resources for assessment</p>	<ul style="list-style-type: none"> • Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the endorsed Assessment Instrument. • Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting. • Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace. • Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints. • Assessment is to comply with appropriate standard requirements. • Applicants must have access to: <ul style="list-style-type: none"> • Personal Protective Equipment (PPE) for the purpose of the Performance Assessment • appropriate vehicle loading crane (10 metre tonne or more) and associated equipment in safe condition • appropriate lifting gear in safe condition • Suitable loads as specified by the endorsed Assessment Instrument

EVIDENCE GUIDE	
	<ul style="list-style-type: none"> • communication equipment (e.g. two-way radios, whistles, etc.) • other associated personnel to sling and direct the loads.
Method of assessment	<ul style="list-style-type: none"> • Assessment must be conducted using the endorsed Assessment Instruments. These Instruments provide advice on their application. • The use of 'simulators' in the assessment of this unit of competency is not acceptable. • Assessment may be in conjunction with the assessment of other units of competency. • Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. • Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.
Guidance information for assessment	<ul style="list-style-type: none"> • Further information about endorsed Assessment Instruments may be obtained from state/territory OH&S regulators.

Range Statement

RANGE STATEMENT	
<p><i>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below.</i></p>	
Hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • ground stability (e.g. ground condition, recently filled trenches, slopes) • overhead hazards (e.g. powerlines, service pipes) • traffic (e.g. pedestrians, vehicles, other plant) • Insufficient lighting • environmental conditions (e.g. wind, lightning, storms, etc.) • positioning of crane operator • other specific hazards (e.g. dangerous materials)

RANGE STATEMENT	
Hazard control measures	<p>Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls</p> <p>It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk:</p> <ol style="list-style-type: none"> 1 elimination 2 substitution 3 isolation 4 engineering control measures 5 using safe work practices 6 personal protective equipment
Appropriate standards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • codes of practice • legislation • Australian standards especially AS2550.1 - 2002 (6.5) • manufacturer's specifications • industry standards
Associated personnel	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • doggers • riggers
Lifting equipment	<p>May include but not be limited to:</p> <ul style="list-style-type: none"> • chain slings • wire and synthetic slings • shackles • eyebolts
Crane	<p>A crane with a capacity of 10 metre tonnes and above mounted on a vehicle for the principle purpose of loading and unloading such a vehicle</p>
Appropriate	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • crane capabilities • environmental conditions (e.g. wind, lightning, storms, etc.)
Communication method	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • verbal and non-verbal language • written instructions

RANGE STATEMENT	
	<ul style="list-style-type: none"> • signage • hand signals • listening • questioning to confirm understanding • appropriate worksite protocol
Signage and labels	May include but not limited to: <ul style="list-style-type: none"> • crane data plates/labels • load charts • crane decals • control labels
Procedures	May include but not limited to: <ul style="list-style-type: none"> • manufacturer's guidelines (instructions, specifications or checklists) • industry operating procedures • workplace procedures (work instructions, operating procedures, checklists)
Controls	May include but not limited to: <ul style="list-style-type: none"> • luffing levers • knuckling levers • hoisting and lowering levers • slewing levers including brake • boom extension levers (where fitted)
Service logbook	May include but not limited to: <ul style="list-style-type: none"> • any logbook • service book • history record system where the service and maintenance history is kept
Crane safety devices	May include but not limited to: <ul style="list-style-type: none"> • horns/sirens • audible and visual warning devices • lights
Communication equipment	May include but not limited to: <ul style="list-style-type: none"> • fixed frequency two-way radios • whistles
Ground suitability	May include but not limited to: <ul style="list-style-type: none"> • rough uneven ground

RANGE STATEMENT	
	<ul style="list-style-type: none"> • backfilled ground • soft soils • hard compacted soil • rock • bitumen • concrete
Stability	May include but not limited to: <ul style="list-style-type: none"> • deploying outriggers • establishing correct size plates or packing • correctly positioning plates or packing
Hazard prevention/control measures	May include but not limited to: <ul style="list-style-type: none"> • safety tags on electrical switches/isolators • insulated powerlines • safety observer used inside exclusion zone • disconnected power • traffic barricades and controls • pedestrian controls • trench covers • movement of obstructions • personal protective equipment • adequate illumination
Load destination	May include but not limited to: <ul style="list-style-type: none"> • ground • vehicles
Defined techniques	May include but not limited to: <ul style="list-style-type: none"> • fixed lifting points • basic reeved slings
Test lift	The load is lifted just clear of the lifting plane to allow for checks to be safely made in consultation with associated personnel to ensure that: <ul style="list-style-type: none"> • near capacity loads do not overload the crane • loads of unusual shape or weight distribution are correctly slung • load measuring equipment can be used to verify the calculated weight of the load • all equipment is functioning properly • adjustments to the slinging can be made in a safe

RANGE STATEMENT	
	manner
Relevant crane movements	May include but not limited to: <ul style="list-style-type: none"> • luffing • slewing • knuckling • telescoping • raise and lower hoist
Communication signals	May include but not limited to: <ul style="list-style-type: none"> • stop - hand • stop - whistle • hoist up - hand • hoist up - whistle • hoist down - hand • hoist down - whistle • luff boom down - hand • luff boom down - whistle • luff boom up - hand • luff boom up - whistle • telescope out - hand • telescope out - whistle • telescope in - hand • telescope in - whistle
Unplanned and/or unsafe situations	May include but not limited to: <ul style="list-style-type: none"> • failure/loss of control (e.g. brakes and steering) • failure of equipment (e.g. hydraulic system) • environmental conditions (e.g. wind, lightning, storms, etc.)
Shut down	May include but not limited to: <ul style="list-style-type: none"> • retracting boom/jib (where applicable) • retracting hoist rope and hook block • folding boom/jib into the transport position • retracting outriggers/stabilisers • idling engine to stabilise temperature • turning off engine (where applicable) • removing key from ignition (where applicable) • locking and securing cabin (where applicable) • securing crane for travel

Unit Sector(s)

Not Applicable

TLILIC3003A Licence to operate a bridge and gantry crane

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor	<p>This unit specifies the outcomes required to operate a bridge and gantry crane. It does not cover the types that are controlled from a location remote to a permanent cabin/control station on the crane and that have three or less powered operations, that is hoist/raise and lower is one operation, for licensing purposes.</p>
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Application of the Unit

Application of the Unit	<p>This unit requires the operator to plan the work, conduct routine checks, transfer loads, and shut down and secure crane.</p> <p>This unit is based on the requirements of the National Standard for Licensing Persons Performing High Risk Work.</p> <p>This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.</p>
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Not Applicable

Employability Skills Information

Employability Skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

<i>Elements describe the essential outcomes of a unit of competency</i>	<i>Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.</i>
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan work	1.1 Potential <i>hazards</i> are identified in the workplace 1.2 <i>Hazard control measures</i> are identified consistent with <i>appropriate standards</i> to ensure the safety of personnel and equipment 1.3 Weight (mass) of the load is estimated in consultation with <i>associated personnel</i> 1.4 Appropriate paths for the movement of loads in the work area are determined 1.5 <i>Crane</i> is appropriate to the load/s 1.6 Appropriate <i>communication methods</i> are identified with <i>associated personnel</i>
2. Conduct routine checks	2.1 Appropriate <i>hazard prevention/control measures</i> are applied to the work area according to <i>procedures</i> 2.2 <i>Crane</i> is accessed in a safe manner 2.3 <i>Crane</i> is visually checked for any damage or defects 2.4 All <i>signage and labels</i> are visible and legible according to the <i>appropriate standard</i> 2.5 Routine pre-operational crane checks are carried out according to <i>procedures</i> 2.6 All <i>controls</i> are located and identified 2.7 Crane <i>service logbook</i> is checked for compliance 2.8 <i>Crane</i> is started according to <i>procedures</i> and checked for any abnormal noises 2.9 Crane <i>safety devices</i> are tested according to <i>procedures</i> 2.10 Post-start operational checks are carried out according to <i>procedures</i> 2.11 All <i>communication equipment</i> is checked for serviceability 2.12 All damage and defects are reported and recorded according to <i>procedures</i> , and appropriate action is taken
3. Transfer loads	3.1 Hoist block is positioned over load following directions from <i>associated personnel</i> 3.2 <i>Test lift</i> is carried out according to <i>procedures</i> . 3.3 Loads are transferred using all <i>relevant crane movements</i> according to <i>procedures</i> and the <i>appropriate standard</i> 3.4 All required <i>communication signals</i> are interpreted correctly according to <i>procedures</i> and the

ELEMENT	PERFORMANCE CRITERIA
	<p><i>appropriate standard</i></p> <p>3.5 <i>Crane</i> is operated according to <i>procedures</i></p> <p>3.6 Load movements are monitored constantly ensuring safety to personnel and load, and structural stability</p> <p>3.7 <i>Unplanned and/or unsafe situations</i> are responded to in line with <i>procedures</i></p>
4. Shut down and secure crane	<p>4.1 <i>Crane</i> is parked according to <i>procedures</i></p> <p>4.2 <i>Crane</i> and equipment are stowed and secured according to <i>procedures</i> and the <i>appropriate standard</i></p> <p>4.3 All relevant motion locks and brakes are applied (where applicable)</p> <p>4.4 Crane is <i>shut down</i> according to <i>procedures</i>.</p> <p>4.5 Routine post-operational crane checks are carried out according to <i>procedures</i></p> <p>4.6 <i>Hazard prevention/control measures</i> are removed (where applicable)</p> <p>4.7 All damage and defects are reported and recorded according to <i>procedures</i>, and appropriate action is taken</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE
<i>This describes the essential skills and knowledge and their level required for this unit.</i>
Required skills:
<ul style="list-style-type: none"> • Accurately record and maintain information relating to bridge and gantry crane operations • Use communication techniques in the workplace including hand signals, whistles and use of two-way radios • Use interpersonal communication skills at a level sufficient to communicate with other site personnel • Operate a bridge and gantry crane including all functions to their maximum for the lifting and moving of loads to the maximum rated capacity in conjunction with other associated personnel • Apply risk assessment and hazard control strategies, including hierarchy of control as applied to the safe operation of the crane (particular awareness of the risks associated with overhead powerlines/electrical cables, access to cabin, vehicles and

REQUIRED SKILLS AND KNOWLEDGE

clear access whilst travelling)

- Use and interpret crane manufacturer's specifications and data, including maximum load to ensure the crane is not overloaded
- Verify problems and equipment faults and demonstrate appropriate response procedures

Required knowledge:

- Appropriate mathematical procedures for estimation of loads
- Bridge and gantry crane characteristics
- Commonwealth, state or territory OH&S legislation, standards and codes of practice relevant to the full range of processes for the crane class
- Emergency procedures including escape routes
- Level of literacy to be able to read and comprehend manufacturer's instructions, procedures and safety signs
- Understanding of the hierarchy of hazard identification and control
- Organisational and workplace standards, requirements, policies and procedures for conducting operations for the crane class
- Procedures for the recording, reporting and maintenance of workplace records and information
- Typical routine problems encountered in the operation of the crane and equipment and adjustments required for correction

Evidence Guide**EVIDENCE GUIDE**

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the assessment guidelines for the Training Package.

Overview of assessment

- Successful assessment of this unit meets the competency requirement of the National Standard for Licensing Persons Performing High Risk Work.
- State/territory OH&S regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for OH&S matters.

Critical aspects for assessment and evidence required to demonstrate

- Compliance with OH&S licensing legislation.
- Communicate and work safely with others in the work area.

EVIDENCE GUIDE	
competency in this unit	<ul style="list-style-type: none"> • Risk assessment and management procedures (particular awareness of the risks associated with overhead powerlines/electrical cables, access to cabin, other vehicles and clear access whilst travelling). • Conduct of pre- and post-operational checks of the bridge and gantry crane. • Operation of a bridge and gantry crane including all functions to their maximum capacity in the lifting and moving of loads to the maximum rated capacity in conjunction with other associated personnel. • Appropriate mathematical procedures for estimation of loads.
Context of and specific resources for assessment	<ul style="list-style-type: none"> • Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the endorsed Assessment Instrument. • Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting. • Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace. • Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints. • Assessment is to comply with relevant appropriate standard requirements. • Applicants must have access to: <ul style="list-style-type: none"> • Personal Protective Equipment (PPE) for the purpose of the Performance Assessment • appropriate bridge and gantry crane and associated equipment in safe condition • suitable loads as specified by the endorsed Assessment Instrument • communication equipment (e.g. two-way radios, whistles etc. • other associated personnel to sling and direct the loads.
Method of assessment	<ul style="list-style-type: none"> • Assessment must be conducted using the endorsed Assessment Instrument. These Instruments provide

EVIDENCE GUIDE	
	<p>advice on their application.</p> <ul style="list-style-type: none"> • The use of 'simulators' in the assessment of this unit of competency is not acceptable. • Assessment may be in conjunction with the assessment of other units of competency. <ul style="list-style-type: none"> • Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. • Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.
Guidance information for assessment	<ul style="list-style-type: none"> • Further information about endorsed Assessment Instruments may be obtained from state/territory OH&S regulators.

Range Statement

RANGE STATEMENT	
<p><i>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below.</i></p>	
Hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • ground stability (e.g. ground condition or slopes for load placement) • overhead hazards (e.g. powerlines, service pipes) • insufficient lighting • traffic (e.g. pedestrians, vehicles, plant) • environmental conditions (e.g. wind, lightning, storms) • other specific hazards (e.g. dangerous materials)
Hazard control measures	<p>Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls</p> <p>It includes the application of the hierarchy of control, the six-step preference of control measures</p>

RANGE STATEMENT	
	<p>to manage and control risk:</p> <ol style="list-style-type: none"> 1 elimination 2 substitution 3 isolation 4 engineering control measures 5 using safe work practices 6 personal protective equipment
Appropriate standards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • codes of practice • legislation • Australian standards • manufacturer's specifications • industry standards (where applicable)
Associated personnel	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • riggers • doggers
Crane	<p>May include:</p> <ul style="list-style-type: none"> • bridge crane, a bridge beam mounted at each end to an end carriage, capable of travelling along elevated runways and having one or more hoisting mechanisms arranged to traverse across the bridge • gantry crane, a bridge beam, supported at each end by legs mounted on end carriages, capable of travelling on supported surfaces or deck levels, whether fixed or not and which has a crab with one or more hoisting units arranged to travel across the bridge <p>Bridge and gantry:</p> <ul style="list-style-type: none"> • excluded are cranes of the type that are controlled from a location remote to a permanent cabin/control station on the crane and that have three or less powered operations, that is hoist raise and lower is one operation
Communication method	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • verbal and non-verbal language • written instructions • signage

RANGE STATEMENT	
	<ul style="list-style-type: none"> • hand signals • listening • questioning to confirm understanding • appropriate worksite protocol
Signage and labels	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • crane data plates/labels • load charts • crane decals • control labels
Procedures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • manufacturer's guidelines (instructions, specifications or checklists) • industry operating procedures • workplace procedures (work instructions, operating procedures, checklists)
Controls	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • long travel levers • cross travel levers • hoisting and lowering levers • rotating hook levers (where applicable)
Service logbook	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • any logbook • service book • history record system where the service and maintenance history is kept
Safety devices	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • horns/sirens • audible and visual motion devices • operator restraint devices (where applicable) • lights
Communication equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • two-way radios • whistles • bells • buzzers
Hazard prevention/control	<p>May include but not limited to:</p>

RANGE STATEMENT	
measures	<ul style="list-style-type: none"> • safety tags on electrical switches/isolators • insulated powerlines • safety observer used inside exclusion zone • disconnected power • traffic barricades and controls • pedestrian controls • movement of obstructions • personal protective equipment • adequate illumination
Test lift means	<p>The load is lifted just clear of the lifting plane to allow for checks to be safely made in consultation with associated personnel to ensure that:</p> <ul style="list-style-type: none"> • near capacity loads do not overload the crane • loads of unusual shape or weight distribution are correctly slung • load measuring equipment can be used to verify the calculated weight of the load • all crane equipment is functioning properly • adjustments to the slinging can be made in a safe manner
Relevant crane movements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • hoisting (raise and lower) • traversing (moving hoisting mechanisms along bridge) • travelling (at minimum speed, gentle acceleration and braking, to minimise load swing)
Communication signals	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • stop - hand • stop - whistle • hoist up - hand • hoist up - whistle • hoist down - hand • hoist down - whistle • traverse - hand • travel - hand • creep - hand
Unplanned and/or unsafe situations	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • failure/loss of control (e.g. brakes and steering)

RANGE STATEMENT	
	<ul style="list-style-type: none">• failure of equipment (e.g. hydraulic system)• environmental conditions (e.g. wind, lightning, storms, etc.)
Shut down	May include but not limited to: <ul style="list-style-type: none">• retracting hoist rope and hook block• travelling crane to park position• removing key from control panel (where applicable)• locking and securing cabin (where applicable)• isolating power to crane

Unit Sector(s)

Not Applicable

TLILIC2005A Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

Modification History

Release 2. This is the second release of this unit in the TLI10 Transport and Logistics Training Package Version 4.0.

In Release 2 the spelling of 'meters' has been changed to 'metres' throughout the unit (typo). Release 2 is equivalent to the previous release.

Unit Descriptor

This unit specifies the outcomes required to operate a boom-type elevating work platform (boom length 11 metres or more) for licensing purposes, and involves the operation of a telescoping device, hinged device, or articulated device or any combination of these used to support a platform on which personnel, equipment and materials may be elevated to perform work. The 11 metre boom length shall be taken to mean the greater of the following:

- (a) The vertical distance from the floor of the platform to the surface supporting the elevating work platform with the platform at its maximum height; or
- (b) The nominal reach, measured horizontally from the centre point of rotation to the outer edge of the platform in its most extended position.

Application of the Unit

This unit requires the operator to plan the work, conduct routine checks, set up elevating work platform, operate elevating work platform and shut down and secure elevating work platform. This unit is based on the requirements of the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

Licensing/Regulatory Information

Refer to Unit Descriptor.

Pre-Requisites

Nil.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

- | | | |
|---------------------------------|------|--|
| 1 Plan work | 1.1 | Potential workplace hazards are identified |
| | 1.2 | Hazard control measures are identified consistent with appropriate standards to ensure the safety of personnel and equipment |
| | 1.3 | Elevating work platform is appropriate for the task |
| | 1.4 | Appropriate communication methods are identified |
| 2 Conduct routine checks | 2.1 | Service logbook for elevating work platform is checked for compliance |
| | 2.2 | Elevating work platform is visually checked for any defects or damage according to procedures |
| | 2.3 | Routine pre-operational checks are carried out according to procedures |
| | 2.4 | Safety equipment is inspected according to procedures |
| | 2.5 | Elevating work platform is accessed in a safe manner |
| | 2.6 | Fit safety equipment and secure to platform according to procedures |
| | 2.7 | All controls are located and identified |
| | 2.8 | Elevating work platform is started according to procedures |
| | 2.9 | All safety devices are identified and tested according to procedures |
| | 2.10 | Post-start operational checks are carried out according to procedures |
| | 2.11 | All communication equipment is checked (where applicable) |
| | 2.12 | All defects and damage are reported and recorded in according to procedures, and appropriate action is taken |

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- | | | |
|---|-----|--|
| 3 Set up elevating work platform | 3.1 | Ground suitability is inspected and checked |
| | 3.2 | Elevating work platform is driven to or located at work area according to procedures (where applicable) |
| | 3.3 | Elevating work platform is positioned for work application and stability according to procedures |
| | 3.4 | Appropriate hazard prevention/control measures are applied to the work area according to procedures |
| | 3.5 | Work gear and tools are stowed and secured |
| 4 Operate elevating work platform | 4.1 | Elevating work platform is operated using all relevant plant movements according to procedures and the appropriate standards |
| | 4.2 | Elevating work platform is mobiled using best mobile practice and appropriate procedures |
| | 4.3 | Elevated working platform operations are monitored constantly ensuring safety of personnel and stability |
| | 4.4 | Unplanned and/or unsafe situations are responded to in line with procedures |
| 5 Shut down and secure elevating work platform | 5.1 | Elevating work platform is lowered and stowed according to procedures |
| | 5.2 | All relevant motion locks and brakes are applied (where applicable) |
| | 5.3 | Safety equipment is disconnected from platform |
| | 5.4 | Egress from elevated work platform is conducted according to procedures |
| | 5.5 | Outriggers/stabilisers are stowed and secured according to procedures (where applicable) |
| | 5.6 | Plates or packing are stowed and secured (where applicable) |
| | 5.7 | Elevating work platform is shut down according to procedures |
| | 5.8 | Routine post-operational checks are carried out according to procedures |
| | 5.9 | All defects and damage are reported and recorded according to procedures, and appropriate action is taken |

Required Skills and Knowledge

This section describes the knowledge and skills required for this unit.

Required knowledge:

- Appropriate mathematical procedures for estimation of loads, to ensure that the elevating work platform is not overloaded
- Commonwealth, state or territory OH&S legislation, standards and codes of practice relevant to the full range of processes for conducting elevating work platform operations
- Ability to read and comprehend manufacturer's instructions, procedures and safety signs
- Understanding of elevating work platform operations and operating techniques
- Emergency procedures and safety equipment, including the use of safety harness, energy absorber, lanyard and anchor points
- Understanding of organisational and workplace standards, requirements, policies and procedures for conducting elevating work platform operations
- Understanding of the hierarchy of hazard identification and control
- Procedures for the recording, reporting and maintenance of workplace records and information, including the use of the service logbook
- Typical routine problems encountered in the process and with equipment and adjustments required for correction

Required skills:

- Accurately record and maintain information relating to elevating work platform operations
- Assess ground conditions to confirm that the site is suitable (e.g. firm, level and safe) to extend and travel the elevating work platform
- Complete the positioning, stabilising, set up of elevating work platforms, including the use of outriggers/stabilisers and packing
- Operate mobile elevating work platform using best mobile practice
- Use communication skills at a level sufficient to communicate with other site personnel
- Operate and control an elevating work platform including all functions to their maximum extension within the safe working (rated) capacity
- Apply risk assessment and hazard control strategies, including hierarchy of control as applied to the positioning and safe operation of the elevating work platform (particular awareness of the risks associated with overhead powerlines/electrical cables, ground conditions, wind, pedestrians and tipping)
- Use and interpret manufacturer's specifications and data
- Identify problems and equipment faults and where practicable demonstrate appropriate response procedures

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills, the range statement and the assessment guidelines for this Training Package.

Overview of assessment

- Successful assessment of this unit meets the competency requirement of the National Standard for Licensing Persons Performing High Risk Work.
- State/territory OH&S regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for OH&S matters.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- Compliance with OH&S licensing legislation.
- Emergency procedures and safety equipment, including the use of safety harnesses, energy absorbers, lanyard and anchor points.
- Assessment of ground conditions to confirm that the site is suitable (e.g. firm, level and safe) to extend and travel the elevating work platform.
- Risk assessment and hazard control strategies, including hierarchy of control as applied to the positioning and safe operation of the elevating work platform (particular awareness of the risks associated with overhead powerlines/electrical cables, ground conditions, wind, pedestrians and tipping).
- Appropriate procedures for estimation of loads, to ensure that the elevating work platform is not overloaded.
- Positioning and operation of the elevating work platform to ensure that the safest lift is performed.

Context of and specific resources for assessment

- Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the endorsed Assessment Instrument.
- Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace.
- Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace.
- Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints.
- Assessment is to comply with relevant appropriate standard requirements.
- Applicants must have access to:
 - Personal Protective Equipment (PPE) for the purpose of

the Performance Assessment

- appropriate safety equipment in safe condition
- appropriate elevated working platform and associated equipment in safe condition
- communication equipment (e.g. two-way radios, mobile phones etc.) where applicable.

Method of assessment

- Assessment must be conducted using the endorsed Assessment Instruments. These Instruments provide advice on their application.

The use of 'simulators' in the assessment of this unit of competency is not acceptable.

- Assessment may be in conjunction with the assessment of other units of competency.
- Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge.
- Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstances, but is able to be transferred to other circumstances.

Guidance information for assessment

- Further information about endorsed Assessment Instruments may be obtained from state/territory OH&S regulators.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Hazards may include:

- ground stability (e.g. ground condition, recently filled trenches, slopes)
- overhead hazards (e.g. powerlines, service pipes, trees, buildings etc.)
- insufficient lighting
- traffic (e.g. pedestrians, vehicles, plant)
- environmental conditions (e.g. wind, lightning, storms, etc.)
- other specific hazards (e.g. tidal areas, chainsaws, pressure washers, dangerous materials)

Hazard control measures may include: Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls

It includes the application of the hierarchy of control - the six-step preference of control measures to manage and control risk:

- 1) 1. elimination
- 2) 2. substitution
- 3) 3. isolation
- 4) 4. engineering control measures
- 5) 5. using safe work practices
- 6) 6. personal protective equipment

Appropriate standards may include:

- codes of practice
- legislation
- Australian Standards
- manufacturer's specifications
- industry standards (where applicable)

Elevating work platform may include: The operation of a telescoping device, hinged device, or articulated device or any combination of these used to support a platform on which personnel, equipment and materials may be elevated to perform work. Excluded from this definition are platforms of less than 11 metres boom length.

The 11 metre boom length shall be taken to mean the greater of the following:

- (a) The vertical distance from the floor of the platform to the surface supporting the elevating work platform with the platform at its maximum height; or
- (b) The nominal reach, measured horizontally from the centre point of rotation to the outer edge of the platform in its most extended

	position
Communication method may include:	<ul style="list-style-type: none">• verbal and non-verbal language• written instructions• signage• hand signals• listening• questioning to confirm understanding• appropriate worksite protocol
Service logbook may include:	<ul style="list-style-type: none">• any logbook• service book• history record system where the service and maintenance history is kept
Procedures may include:	<ul style="list-style-type: none">• manufacturer's guidelines (instructions, specifications, operators manual or checklists)• industry operating procedures• workplace procedures (work instructions, operating procedures, checklists)
Safety equipment may include:	<ul style="list-style-type: none">• safety harness• energy absorber• lanyard• anchor points
Safety devices may include:	<ul style="list-style-type: none">• horns/sirens• audible and visual reversing devices• operator restraint devices (platform gate)• lights (where applicable)
Communication equipment may include:	<ul style="list-style-type: none">• two-way radios• mobile phone
Ground suitability may include:	<ul style="list-style-type: none">• rough uneven ground• backfilled ground• soft soils• hard compacted soil• rock• bitumen• concrete
Stability may include:	<ul style="list-style-type: none">• deploying outriggers• establishing correct size plates or packing• correctly positioning plates or packing
Hazard prevention/control	<ul style="list-style-type: none">• safety tags on electrical switches/isolators• insulated powerlines• safety observer used inside exclusion zone

- measures may include:
- disconnected power
 - traffic barricades and controls
 - illumination requirements
 - pedestrian controls
 - trench covers
 - movement of obstructions
 - personal protective equipment
 - suitable area for set-up
 - suitable firm and stable standing
- Relevant plant movements may include:
- raising boom
 - lowering boom
 - slewing
 - hinging
 - articulating
 - telescoping
- Best mobile practice may include:
- minimum speed
 - gentle acceleration and braking
 - minimum boom/jib length
 - avoiding ground depressions
- Unplanned and/or unsafe situations may include:
- loss of power
 - failure of controls
 - contact with overhead electrical conductors
 - damage caused by contact with obstructions
 - illness of personnel
- Shut down may include:
- retracting boom/jib (where applicable)
 - folding boom/jib into the transport position
 - retracting outriggers/stabilisers
 - idling engine to stabilise temperature
 - turning off engine (where applicable)
 - removing key from ignition (where applicable)

Unit Sector(s)

Not Applicable.

TLILIC3008A Licence to operate a slewing mobile crane (up to 20 tonnes)

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor	This unit specifies the outcomes required to operate a slewing mobile crane (up to 20 tonnes) for licensing purposes. It encompasses the requirement for non-slewing mobile crane licence and the vehicle loading crane licence.
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Application of the Unit

Application of the Unit	<p>This unit requires the operator to plan the work, conduct routine checks, set up crane, transfer loads, mobile loads and shut down and secure the crane.</p> <p>This unit is based on the requirements of the National Standard for Licensing Persons Performing High Risk Work.</p> <p>This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.</p>
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Not Applicable

Employability Skills Information

Employability Skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

<i>Elements describe the essential outcomes of a unit of competency</i>	<i>Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.</i>
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan work	1.1 Potential workplace <i>hazards</i> are identified 1.2 <i>Hazard prevention/control measures</i> are identified consistent with <i>appropriate standards</i> to ensure the safety of personnel and equipment 1.3 The weight of the load is identified and estimated in consultation with <i>associated personnel</i> 1.4 <i>Crane</i> is <i>appropriate</i> to the load/s and workplace conditions 1.5 Appropriate path for the movement of loads in the work area is inspected and determined 1.6 Appropriate <i>communication methods</i> are identified with <i>associated personnel</i>
2. Conduct routine checks	2.1 <i>Crane</i> is visually checked for any damage or defects 2.2 <i>Crane</i> is accessed in a safe manner 2.3 All <i>signage and labels</i> are visible and legible according to the <i>appropriate standard</i> 2.4 Routine pre-operational crane checks are carried out according to <i>procedures</i> 2.5 All <i>controls</i> are located and identified 2.6 Crane <i>service logbook</i> is checked for compliance 2.7 <i>Crane</i> is started according to <i>procedures</i> and checked for any abnormal noise 2.8 All <i>crane safety devices</i> are tested according to <i>procedures</i> 2.9 Post-start operational checks are carried out according to <i>procedures</i> 2.10 All <i>communication equipment</i> is checked for serviceability 2.11 All damage and defects are reported and recorded according to <i>procedures</i> , and appropriate action is taken
3. Set up crane	3.1 <i>Ground suitability</i> is checked 3.2 <i>Crane</i> is driven to the work area according to <i>procedures</i> 3.3 <i>Crane</i> is positioned for work application and <i>stability</i> according to <i>procedures</i> 3.4 Appropriate <i>crane configuration</i> for work task is determined according to <i>procedures</i> (where applicable) 3.5 Boom/jib and counterweight configuration data is input

ELEMENT	PERFORMANCE CRITERIA
	<p>into the crane computer (as required)</p> <p>3.6 Appropriate <i>hazard prevention/control measures</i> are applied to the work area according to <i>procedures</i></p> <p>3.7 All <i>communications equipment</i> is tested for functionality</p>
4. Transfer load	<p>4.1 Lifts are determined within the capacity of the crane</p> <p>4.2 Boom/jib and hoist block is positioned over load following directions from <i>associated personnel</i></p> <p>4.3 <i>Test lift</i> is carried out according to <i>procedures</i></p> <p>4.4 Loads are transferred using all <i>relevant crane movements</i> according to <i>procedures</i> and the <i>appropriate standard</i></p> <p>4.5 All required <i>communication signals</i> are correctly interpreted according to <i>procedures</i> and the <i>appropriate standard</i></p> <p>4.6 <i>Crane</i> is operated according to <i>procedures</i></p> <p>4.7 Load movement is monitored constantly ensuring safety to personnel and load, and crane stability</p> <p>4.8 <i>Unplanned and/or unsafe</i> situations are responded to in line with <i>procedures</i></p>
5. Mobile load	<p>5.1 Suitability of <i>planned route</i> is checked for the crane according to <i>procedures</i></p> <p>5.2 <i>Crane</i> is configured to mobile load according to <i>procedures</i></p> <p>5.3 Load is moved using <i>best mobile practice</i> according to the <i>appropriate standard</i></p>
6. Shut down and secure crane	<p>6.1 <i>Crane</i> boom/jib and equipment are stowed and secured where appropriate according to <i>procedures</i> and the <i>appropriate standard</i></p> <p>6.2 Relevant motion locks and brakes are applied (where applicable)</p> <p>6.3 Outriggers/stabilisers are stowed and secured according to <i>procedures</i></p> <p>6.4 Crane is <i>shut down</i> according to <i>procedures</i></p> <p>6.5 Plates or packing are stowed and secured</p> <p>6.6 Routine post-operational crane checks are carried out according to <i>procedures</i></p> <p>6.7 All damage and defects are reported and recorded according to <i>procedures</i>, and appropriate action is taken</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level required for this unit.

Required skills:

- Accurately record and maintain information relating to crane operations
- Use communication techniques in the workplace including whistles, hand signals and use of two-way radios
- Use interpersonal communication skills at a level sufficient to communicate with other site personnel
- Load data into crane computer (where fitted) and check operation to accurately reflect the crane configuration
- Operate a slewing mobile crane (up to 20t capacity) for the lifting and moving of loads to the safe working rated capacity in conjunction with other associated personnel
- Apply risk assessment and hazard control strategies, including hierarchy of control as applied to the positioning and safe operation of the crane (particular awareness of the risks associated with overhead powerlines/electrical cables, wind, erection, pack up and crane stability)
- Use and interpret crane manufacturer's specifications and data, including load charts, to enable the crane to be configured for the load
- Verify problems and equipment faults and demonstrate appropriate response procedures

Required knowledge:

- Appropriate mathematical procedures for estimation and measurement of loads
- Commonwealth, state or territory OH&S legislation, standards and codes of practice relevant to the full range of processes for the crane class
- Level of literacy to be able to read and comprehend manufacturer's instructions, procedures and safety signs
- Mobile slewing crane characteristics and capabilities to allow the configuration of the crane to suit the range of loads
- Mobile slewing crane operating techniques
- Understanding of the hierarchy of hazard identification and control
- Organisational and workplace standards, requirements, policies and procedures for conducting operations for the crane class
- Procedures for the recording, reporting and maintenance of workplace records and information
- Rated capacity and working load limits (including use of crane load charts)
- Typical routine problems encountered in the process and with equipment and

REQUIRED SKILLS AND KNOWLEDGE

adjustments required for correction

Evidence Guide**EVIDENCE GUIDE**

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the assessment guidelines for the Training Package.

Overview of assessment	<ul style="list-style-type: none"> • Successful assessment of this unit meets the competency requirement of the National Standard for Licensing Persons Performing High Risk Work. • State/territory OH&S regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for OH&S matters.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<ul style="list-style-type: none"> • Compliance with OH&S licensing legislation. • Communicate and work safely with others in the work area. • Risk assessment and management procedures (particular awareness of the risks associated with overhead powerlines/electrical cables, ground conditions, crane tipping and demolition sites). • Complete the pre-operational check, positioning, stabilising, set up, operation, post-operational checks of a mobile crane including all functions to their maximum extension in the lifting and moving of loads to the safe working rated capacity of the mobile crane up to 20 tonne capacity in conjunction with other associated personnel. • Appropriate mathematical procedures for estimation of loads.
Context of and specific resources for assessment	<ul style="list-style-type: none"> • Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the endorsed Assessment Instrument. • Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting. • Assessors must ensure that the assessment in the

EVIDENCE GUIDE	
	<p>workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace.</p> <ul style="list-style-type: none"> • Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints. • Assessment is to comply with relevant appropriate standard requirements. • Applicants must have access to: <ul style="list-style-type: none"> • Personal Protective Equipment (PPE) for the purpose of the Performance Assessment • appropriate slewing mobile crane (up to 20 tonne) and associated equipment in safe condition • suitable loads as specified by the endorsed Assessment Instrument • communication equipment (e.g. two-way radios, whistles, etc.) • other associated personnel to sling and direct the loads
Method of assessment	<ul style="list-style-type: none"> • Assessment must be conducted using the endorsed Assessment Instruments. These Instruments provide advice on their application. • Assessment may be in conjunction with the assessment of other units of competency. • The use of 'simulators' in the assessment of this unit of competency is not acceptable. • Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. • Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstances, but is able to be transferred to other circumstances.
Guidance information for assessment	<p>Further information about endorsed Assessment Instruments may be obtained from state/territory OH&S regulators.</p>

Range Statement

RANGE STATEMENT	
<p><i>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below.</i></p>	
Hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • ground stability (e.g. ground condition, recently filled trenches, slopes) • overhead hazards (e.g. powerlines, service pipes) • traffic (e.g. pedestrians, vehicles, other plant) • insufficient lighting • environmental conditions (e.g. wind, lightning, storms, etc.) • other specific hazards (e.g. dangerous materials)
Hazard control measures	<p>Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls</p> <p>It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk:</p> <ol style="list-style-type: none"> 1 elimination 2 substitution 3 isolation 4 engineering control measures 5 using safe work practices 6 personal protective equipment
Appropriate standard	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • codes of practice (mobile crane) • legislation • Australian standard • manufacturer's specifications • industry standards (where applicable)
Associated personnel	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • riggers • doggers
Appropriate	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • crane capabilities

RANGE STATEMENT	
	<ul style="list-style-type: none"> environmental conditions (e.g. wind, lightning, storms, etc.)
Crane	<p>May include a boom or jib, which is capable of being slewed (up to 20 tonnes capacity)</p> <p>The slewing mobile crane up to 20 tonnes classification encompasses the requirements for the non-slewing mobile crane classification and the vehicle loading crane classification</p> <p>NB: This excludes front-end loader, backhoe, excavator or like equipment when configured for crane operation</p>
Communication method	<p>May include but not limited to:</p> <ul style="list-style-type: none"> verbal and non-verbal language written instructions signage hand signals listening questioning to confirm understanding appropriate worksite protocol
Signage and labels	<p>May include but not limited to:</p> <ul style="list-style-type: none"> crane data plates/labels load charts crane decals control labels
Procedures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> manufacturer's guidelines (instructions, specifications or checklists) industry operating procedures workplace procedures (work instructions, operating procedures, checklists)
Controls	<p>May include but not limited to:</p> <ul style="list-style-type: none"> luffing levers hoisting and lowering levers slewing levers including brake boom extension levers (where fitted)
Service logbook	<p>May include but not limited to:</p> <ul style="list-style-type: none"> any logbook

RANGE STATEMENT	
	<ul style="list-style-type: none"> • service book • history record system where the service and maintenance history is kept
Crane safety devices	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • horns/sirens • audible and visual reversing devices • operator restraint devices • lights
Communication equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • two-way radios • whistles • bells • buzzers <p>NB: where radio communication equipment is used the transmitting frequencies of the equipment must be selected to prevent interference to or from other radio equipment being used in the vicinity of the crane</p>
Ground suitability	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • rough uneven ground • backfilled ground • soft soils • hard compacted soil • rock • bitumen • concrete
Stability	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • deploying outriggers • establishing correct size plates or packing • correctly positioning plates or packing
Crane configuration	<p>May include but not be limited to:</p> <ul style="list-style-type: none"> • boom/jib • fly-jib • counterweights
Hazard prevention/control measures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • safety tags on electrical switches/isolators • insulated powerlines

RANGE STATEMENT	
	<ul style="list-style-type: none"> • safety observer used inside exclusion zone • disconnected power • traffic barricades and control • pedestrian barricades • trench covers • movement of obstructions • personal protective equipment • adequate illumination
Test lift	<p>The load is lifted just clear of the lifting plane to allow for checks to be safely made in consultation with associated personnel to ensure that:</p> <ul style="list-style-type: none"> • near capacity loads do not overload the crane • loads of unusual shape or weight distribution are correctly slung • load measuring equipment can be used to verify the calculated weight of the load • all crane equipment is functioning properly • adjustments to the slinging can be made in a safe manner
Relevant crane movements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • telescope in and out • boom/jib up and down • slew boom/jib • operation of outriggers/stabilisers • raise and lower hoist • travel
Communication signals	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • stop - hand • stop - whistle • hoist up - hand • hoist up - whistle • hoist down - hand • hoist down - whistle • luff boom down - hand • luff boom down - whistle • luff boom up - hand • luff boom up - whistle • telescope out - hand • telescope out - whistle

RANGE STATEMENT	
	<ul style="list-style-type: none"> • telescope in - hand • telescope in - whistle • slew left - hand • slew left - whistle • slew right - hand • slew right - whistle • travel - hand
Unplanned and/or unsafe situations	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • failure/loss of control (e.g. brakes and steering) • failure of equipment (e.g. hydraulic system) • environmental conditions (e.g. wind, lightning, storms, etc.)
Planned route	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • unusual or difficult terrains • obstacles or obstruction
Best mobile practice	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • minimum speed • gentle acceleration and braking (to minimise load swing) • minimum boom/jib length • carrying the load near to the ground surface • boom/jib in line with the crane • boom/jib as low as possible • load faces uphill • use of handheld taglines
Shut Down	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • retracting boom/jib • retracting hoist rope and hook block • positioning/securing boom/jib • retracting outriggers/stabilisers • idling engine to stabilise temperature • turning off engine (where applicable) • removing key from ignition (where applicable) • locking and securing cabin (where applicable)

Unit Sector(s)

Not Applicable

TLILIC4009A Licence to operate a slewing mobile crane (up to 60 tonnes)

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor	This unit specifies the outcomes required to operate a slewing mobile crane (up to 60 tonnes) for licensing purposes. It encompasses the requirement for the up to 20 tonnes licence.
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Application of the Unit

Application of the Unit	<p>This unit requires the operator to plan the work, conduct routine checks, set up crane, transfer loads, mobile loads and shut down and secure the crane.</p> <p>This unit is based on the requirements of the National Standard for Licensing Persons Performing High Risk Work.</p> <p>This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.</p>
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Not Applicable

Employability Skills Information

Employability Skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

<i>Elements describe the essential outcomes of a unit of competency</i>	<i>Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.</i>
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan work	1.1 Potential workplace hazards are identified 1.2 Hazard control measures are identified consistent with appropriate standards to ensure the safety of personnel and equipment 1.3 The weight of the load is identified and estimated in consultation with associated personnel 1.4 The crane is appropriate to the load/s and workplace conditions 1.5 Appropriate paths for the movement of loads in the work area are inspected and determined 1.6 Appropriate communication methods are identified with associated personnel
2. Conduct routine checks	2.1 Crane is visually checked for any damage or defects 2.2 Crane is accessed in a safe manner 2.3 All signage and labels are visible and legible according to the appropriate standard 2.4 Routine pre-operational crane checks are carried out according to procedures 2.5 All controls are located and identified 2.6 Crane service logbook is checked for compliance 2.7 Crane is started according to procedures and checked for any abnormal noises 2.8 All crane safety devices are tested according to procedures 2.9 Post-start operational checks are carried out according to procedures 2.10 All communication equipment is checked for serviceability 2.11 All damage and defects are reported and recorded according to procedures , and appropriate action is taken
3. Set up cane	3.1 Ground suitability is checked 3.2 Crane is driven to the work area according to procedures 3.3 Crane is positioned for work application and stability according to procedures 3.4 Appropriate crane configuration for work task is determined according to procedures (where applicable) 3.5 Boom/jib and counterweight configuration data is input into the crane computer (as required)

ELEMENT	PERFORMANCE CRITERIA
	<p>3.6 Appropriate <i>hazard prevention/control measures</i> are applied to the work area according to <i>procedures</i></p> <p>3.7 All <i>communications equipment</i> is tested for functionality</p>
4. Transfer load	<p>4.1 Lifts are determined within the capacity of the crane</p> <p>4.2 Boom/jib and hoist block is positioned over load following directions from <i>associated personnel</i></p> <p>4.3 <i>Test lift</i> is carried out according to <i>procedures</i></p> <p>4.4 Loads are transferred using all <i>relevant crane movements</i> according to <i>procedures</i> and the <i>appropriate standard</i></p> <p>4.5 All required <i>communication signals</i> are correctly interpreted according to <i>procedures</i> and the <i>appropriate standard</i></p> <p>4.6 <i>Crane</i> is operated according to <i>procedures</i></p> <p>4.7 Load movement is monitored constantly ensuring safety to personnel and load, and crane stability</p> <p>4.8 <i>Unplanned and/or unsafe</i> situations are responded to in line with <i>procedures</i></p>
5. Mobile load	<p>5.1 Suitability of <i>planned route</i> is checked for the crane according to <i>procedures</i></p> <p>5.2 <i>Crane</i> is configured to mobile load according to <i>procedures</i></p> <p>5.3 Load is moved using <i>best mobile practice</i> according to the <i>appropriate standard</i></p>
6. Shut down and secure crane	<p>6.1 <i>Crane</i> boom/jib and equipment are stowed and secured where appropriate according to <i>procedures</i> and the <i>appropriate standard</i></p> <p>6.2 Relevant motion locks and brakes are applied (where applicable)</p> <p>6.3 Outriggers/stabilisers are stowed and secured according to <i>procedures</i></p> <p>6.4 Crane is <i>shut down</i> according to <i>procedures</i></p> <p>6.5 Plates or packing are stowed and secured</p> <p>6.6 Routine post-operational crane checks are carried out according to <i>procedures</i></p> <p>6.7 All damage and defects are reported and recorded according to <i>procedures</i>, and appropriate action is taken</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level required for this unit.

Required skills:

- Accurately record and maintain information relating to crane operations
- Use communication techniques in the workplace including whistles, hand signals and use of two-way radios
- Use interpersonal communication skills at a level sufficient to communicate with other site personnel
- Load data into crane computer (where fitted) and check operation to accurately reflect the crane configuration
- Operate a slewing mobile crane (21t up to 60t capacity) for the lifting and moving of loads to the safe working rated capacity in conjunction with other associated personnel
- Apply risk assessment and hazard control strategies, including hierarchy of control as applied to the positioning and safe operation of the crane (particular awareness of the risks associated with overhead powerlines/electrical cables, wind, erection, pack up and crane stability)
- Use and interpret crane manufacturer's specifications and data, including load charts, to enable the crane to be configured for the load
- Verify problems and equipment faults and demonstrate appropriate response procedures

Required knowledge:

- Appropriate mathematical procedures for estimation and measurement of loads
- Commonwealth, state or territory OH&S legislation, standards and codes of practice relevant to the full range of processes for the crane class
- Level of literacy to be able to read and comprehend manufacturer's instructions, procedures and safety signs
- Mobile slewing crane characteristics and capabilities to allow the configuration of the crane to suit the range of loads
- Mobile slewing crane operating techniques
- Understanding of the hierarchy of hazard identification and control
- Organisational and workplace standards, requirements, policies and procedures for conducting operations for the crane class
- Procedures for the recording, reporting and maintenance of workplace records and information
- Rated capacity and working load limits (including use of crane load charts)
- Typical routine problems encountered in the process and with equipment and adjustments required for correction

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the assessment guidelines for the Training Package.

Overview of assessment

- Successful assessment of this unit meets the competency requirement of the National Standard for Licensing Persons Performing High Risk Work.
- State/territory OH&S regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for OH&S matters.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

- Compliance with OH&S licensing legislation.
- Effectively communicate and work safely with others in the work area.
- Risk assessment and management procedures (particular awareness of the risks associated with overhead powerlines/electrical cables, ground conditions, crane tipping and demolition sites).
- Effectively complete the pre-operational check, positioning, stabilising, set up, operation, post-operational checks of a mobile crane including all functions to their maximum extension in the lifting and moving of loads to the safe working rated capacity of the mobile crane up to 60 tonne capacity in conjunction with other associated personnel.
- Appropriate mathematical procedures for estimation of loads.

Context of and specific resources for assessment

- Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the endorsed Assessment Instrument.
- Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting.
- Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable

EVIDENCE GUIDE	
	<p>working area is made available to suit the assessment and the workplace.</p> <ul style="list-style-type: none"> • Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints. • Assessment is to comply with relevant appropriate standard requirements. • Applicants must have access to: <ul style="list-style-type: none"> • Personal Protective Equipment (PPE) for the purpose of the Performance Assessment. • appropriate slewing mobile crane (21tonne up to 60 tonne) and associated equipment in safe condition • suitable loads as specified by the endorsed Assessment Instrument • communication equipment (e.g. two-way radios, whistles, etc.) • other associated personnel to sling and direct the loads.
Method of assessment	<ul style="list-style-type: none"> • Assessment must be conducted using the endorsed Assessment Instruments. These Instruments provide advice on their application. • The use of 'simulators' in the assessment of this unit of competency is not acceptable. • Assessment may be in conjunction with the assessment of other units of competency. • Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. • Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstances, but is able to be transferred to other circumstances.
Guidance information for assessment	<ul style="list-style-type: none"> • Further information about endorsed Assessment Instruments may be obtained from State/territory OH&S regulators.

Range Statement

RANGE STATEMENT

RANGE STATEMENT	
<i>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below.</i>	
Hazards	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • ground stability (e.g. ground condition, recently filled trenches, slopes) • overhead hazards (e.g. powerlines, service pipes) • traffic (e.g. pedestrians, vehicles, other plant) • insufficient lighting • environmental conditions (e.g. wind, lightning, storms, etc.) • other specific hazards (e.g. dangerous materials)
Hazard control measures	<p>Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls</p> <p>It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk:</p> <ol style="list-style-type: none"> 1 elimination 2 substitution 3 isolation 4 engineering control measures 5 using safe work practices 6 personal protective equipment
Appropriate standard	<p>May include:</p> <ul style="list-style-type: none"> • codes of practice (mobile crane) • legislation • Australian standards • manufacturer's specifications • industry standards (where applicable)
Associated personnel	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • riggers • doggers
Appropriate	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • crane capabilities • environmental conditions (e.g. wind, lightning,

RANGE STATEMENT	
	storms, etc.)
Crane	<p>May include a boom or jib, which is capable of being slewed (up to 60 tonnes capacity)</p> <p>The slewing mobile crane up to 60 tonnes classification encompasses the requirements for the up to 20 tonnes classification</p>
Communication method	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • verbal and non-verbal language • written instructions • signage • hand signals • listening • questioning to confirm understanding • appropriate worksite protocol
Signage and labels	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • crane data plates/labels • load charts • crane decals • control labels
Procedures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • manufacturer's guidelines (instructions, specifications or checklists) • industry operating procedures • workplace procedures (work instructions, operating procedures, checklists)
Controls	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • luffing levers • hoisting and lowering levers • slewing levers including brake • boom extension levers (where fitted)
Service logbook	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • any logbook • service book • history record system where the service and maintenance history is kept
Crane safety devices	<p>May include but not limited to:</p>

RANGE STATEMENT	
	<ul style="list-style-type: none"> • horns/sirens • audible and visual reversing devices • operator restraint devices • lights
Communication equipment	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • fixed channel two-way radios • whistles • bells • buzzers <p>NB: where radio communication equipment is used the transmitting frequencies of the equipment must be selected to prevent interference to or from other radio equipment being used in the vicinity of the crane</p>
Ground suitability	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • rough uneven ground • backfilled ground • soft soils • hard compacted soil • rock • bitumen • concrete
Stability	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • deploying outriggers • establishing correct size plates or packing • correctly positioning plates or packing
Crane configuration	<p>May include but not be limited to:</p> <ul style="list-style-type: none"> • boom/jib • fly-jib • counterweights
Hazard prevention/control measures	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • safety tags on electrical switches/isolators • powerlines insulated • safety observer used inside exclusion zone • power disconnected • traffic barricades and control • pedestrian barricades

RANGE STATEMENT	
	<ul style="list-style-type: none"> • trench covers • movement of obstructions • personal protective equipment • adequate illumination
Test lift	<p>The load is lifted just clear of the lifting plane to allow for checks to be safely made in consultation with associated personnel to ensure that:</p> <ul style="list-style-type: none"> • near capacity loads do not overload the crane • loads of unusual shape or weight distribution are correctly slung • load measuring equipment can be used to verify the calculated weight of the load • all crane equipment is functioning properly • adjustments to the slinging can be made in a safe manner
Relevant crane movements	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • telescope in and out • boom/jib up and down • slew boom/jib • operation of outriggers/stabilisers • raise and lower hoist • travel
Communication signals	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • stop - hand • stop - whistle • hoist up - hand • hoist up - whistle • hoist down - hand • hoist down - whistle • luff boom down - hand • luff boom down - whistle • luff boom up - hand • luff boom up - whistle • telescope out - hand • telescope out - whistle • telescope in - hand • telescope in - whistle • slew left - hand • slew left - whistle

RANGE STATEMENT	
	<ul style="list-style-type: none"> • slew right - hand • slew right - whistle • travel - hand
Unplanned and/or unsafe situations	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • failure/loss of control (e.g. brakes and steering) • failure of equipment (e.g. hydraulic system) • environmental conditions (e.g. wind, lightning, storms, etc.)
Planned route	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • unusual or difficult terrains • obstacles or obstructions
Best mobile practice	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • minimum speed • gentle acceleration and braking (to minimise load swing) • minimum boom/jib length • carrying the load near to the ground surface • boom/jib in line with the crane • boom/jib as low as possible • load faces uphill • use of handheld taglines
Shut down	<p>May include but not limited to:</p> <ul style="list-style-type: none"> • retracting boom/jib • retracting hoist rope and hook block • positioning/securing boom/jib • retracting outriggers/stabilisers • idling engine to stabilise temperature • turning off engine (where applicable) • removing key from ignition (where applicable) • locking and securing cabin (where applicable)

Unit Sector(s)

Not Applicable

UEENEEC001B Maintain documentation

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers the maintenance of the variety of documentation required to record work activities, purchases and expenses and compliance obligations. It encompasses documentation typically required in an electrotechnology enterprise, work instructions and procedures and time management.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

There are no prerequisite competencies for this unit.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to maintain documentation	1.1 Documentation requirements and methods for the organisation/enterprise are identified, obtained and understood
	1.2 Advice is sought from the work supervisor, when necessary, to ensure the work is correctly documented and coordinated effectively with others
	1.3 Forms required to document work are obtained in accordance with established routines and procedures
	1.4 OHS risk assessment and control measures are documented before work is commenced in accordance with established routine/procedures.
2 Maintain documentation.	2.1 Activities are documented promptly and at the appropriate time in accordance with established routine/procedures
	2.2 Documentation is checked for accuracy and clarity and any anomalies corrected
	2.3 Where applicable, signature is obtained from an appropriate person and the person's identification documented
	2.4 Where applicable, a copy of any required documentation is forwarded to an appropriate person in accordance with established routine/procedures
	2.5 Procedures for referring non-routine events to immediate supervisor for directions are followed

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and maintaining documentation.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EC001B **Maintaining documentation**

Evidence shall show an understanding of maintaining documentation to an extent indicated by the following aspects:

T1. Enterprise communication methods encompassing:

- Communicating with personnel encompassing:
 - Oral communications
 - Written procedures and work instructions
- Communicating with suppliers
- Communicating with customers

T2. Work activities records encompassing:

- Purpose and extent of maintaining work activities records in an enterprise
- Types of records for maintaining work activities in an enterprise
- Methods for recording and maintaining work records
- Work records required by regulation requirements

T3. Using basic computers and applications encompassing:

- Starting up
- Selecting application
- Entering information
- Saving
- Printing

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in

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conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

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competency in this unit

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Maintain documentation in any electrotechnology enterprise information system, including:
 - A Following enterprise documentation requirements.
 - B Enabling documentation to communicate clearly to others.
 - C Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

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Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to maintaining documentation.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with any unit or units that require formal documentation.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by maintaining documentation in any electrotechnology enterprise information system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

Competency Field	11)
	Commercial

UEENEEC005B Estimate electrotechnology projects

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers estimate material and labour costs for competitive quotation/tenders for work exceeding \$20k. It encompasses reading and understanding job specifications, material take-offs, determining labour and site requirements, costing and documenting.

Application of the Unit

Application of the Unit 2)

This unit is suitable for competency development employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

There are no prerequisite competencies for this unit.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Ascertain the extent of the project.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures are followed.
	1.3 The extent of the project is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).
	1.4 A date by which the estimate is to be completed is determined from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).
	1.5 Activities are planned to meet scheduled timeframe in consultation with others involved in the work.
2 Estimate project.	2.1 Material take-offs are performed accurately and checked against job specifications.
	2.2 Materials, labour and other costs are determined from industry standard labour rates, enterprise costing arrangements and /or material suppliers.
	2.3 Sources and availability of materials and human resources needed for the project are established in accordance with organisation policies and procedures.
	2.4 Estimates are checked and revised where necessary, for accuracy in costing and against job specification, in consultation with appropriate person(s).
	2.5 Solutions to unplanned events are implemented consistent with enterprise policy.
3 Document and submit quotation.	3.1 Project estimates are documented in accordance with established policies and procedures.
	3.2 Quotation is forwarded to appropriate person(s) for inclusion in a submission within the specified

ELEMENT

PERFORMANCE CRITERIA

timeframe.

- 3.3 Quotation documentation is filed in accordance with established policies and procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and estimating electrotechnology projects.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EC005B

Electrotechnology projects estimation

Evidence shall show an understanding of estimating electrotechnology projects to an extent indicated by the following aspects:

T1. Estimating electrotechnology projects encompassing:

- Documents used in estimating
- Resources to be quantified and costed
- Material take-off methods
- Costing:
 - resource (labour, plant, equipment and materials)
 - contingency
 - money
 - margins
- Labour rates method of costing
- Life cycle costing analysis
- Documenting estimations and costing.
- Evaluating estimates and costs

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment

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Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also

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comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Estimate electrotechnology projects as described in 8) including:
 - A Ascertaining the extent of the project accurately.
 - B Planning estimation work effectively.
 - C Estimating the job competitively.
 - D Checking the estimates accurately.
 - E Documenting the estimates clearly.
 - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

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Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to estimating electrotechnology projects.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEE001B Use basic computer applications relevant to a workplace

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to estimating at least two electrotechnology projects for a competitive quotation/tender. The value of the jobs shall exceeding \$20k and may apply to any of the following electrotechnology disciplines.

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire Protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable/sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

Competency Field **11)**
Commercial

UEENEEC006B Prepare tender submissions for electrotechnology projects

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers the preparation of tender documents. It encompasses reading and understanding tender requirements and project specifications, verifying estimates and capacity to meet timelines, complying with legal requirements and documenting submissions.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

4.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEC005B Estimate electrotechnology projects

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Ascertain tender requirements.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures are followed.
	1.3 The extent of the work under the tender is determined from tender documents.
	1.4 Special conditions and requirements for lodging the tender are ascertained from tender documents.
	1.5 Appropriately competent person(s) is engaged to estimate material, labour and other costs.
	1.6 Activities are planned to meet specified tender closing date/time.
2 Assemble tender submission.	2.1 All inputs to the tender are obtained and checked with person(s) responsible for their development.
	2.2 Materials and human resources needed to complete the work under the conditions of the tender are confirmed with person(s) responsible.
	2.3 Legal advice is sought on contingent aspects of the tender.
	2.4 Contingency allowances are included in the tender in accordance with established policies and procedures.
3 Document tender submission.	3.1 Tender submission is documented in tender lodgement requirements and in accordance with established policies and procedures.
	3.2 Tender submission is checked for accuracy against tender documents and all other inputs and made ready for lodgement before the closing date/time.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and preparing tender submissions.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EC006B Electrotechnology project tenders

Evidence shall show an understanding of electrotechnology project tenders to an extent indicated by the following aspects:

- | | |
|----|---|
| T1 | Purpose and sources of a tender |
| T2 | Documents supplied with a tender |
| T3 | Typical special conditions included in a tender |
| T4 | Tender submission requirements |

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the

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competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

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- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Prepare tender submissions for electrotechnology projects as described in 8) including:
 - A Ascertaining the extent of the work under the tender accurately
 - B Ascertaining special conditions and requirements for lodging the tender
 - C Planning tender submission work effectively
 - D Checking all input to the tender submission accurately
 - E Applying legal advise to contingent issues
 - F Documenting the tender submission ready for lodgement before the closing date/time
 - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to preparing tender submission for electrotechnology projects.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEEC001B Use basic computer applications relevant to a workplace

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to preparing tender submissions for at least two electrotechnology projects. The tenders apply to any of the following electrotechnology disciplines.

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire Protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable/sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

Competency Field **11)**

Commercial

UEENEEC008B Receive and store materials and equipment for electrotechnology work

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers the receiving and storing of materials and equipment for a construction site or workshop store. It encompasses receiving materials and equipment, checking consignment notes, storing materials and equipment and completing the necessary documentation.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work

platforms, powder operated fixing tools, and power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

There are no prerequisite competencies for this unit.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Receive materials and equipment.	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	OHS risk control work measures and procedures are followed.
		1.3	Documentation on pending material and equipment deliveries is read, and content and time of the delivery is understood.
		1.4	Deliveries are checked against consignment documentation before they are received.
		1.5	Discrepancies in deliveries are notified to work supervisor and supplier in accordance with established routines.
		1.6	Materials and equipment are handled in strict accordance with OHS risk control work preparation measures and procedures.

ELEMENT	PERFORMANCE CRITERIA
2 Store materials and equipment.	2.1 OHS risk control work measures and procedures are followed.
	2.2 Material and equipment are stored to prevent damage or loss in accordance with established routines.
	2.3 Security of the stored materials and equipment is maintained in accordance with established routines.
	2.4 Material and equipment documentation is forwarded to an appropriate person in accordance with established routine/procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and of receiving and storing materials and equipment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EC008B

Electrotechnology work store materials and equipment

Evidence shall show an understanding of electrotechnology work store materials and equipment to an extent indicated by the following aspects:

T1. Enterprise communication methods encompassing:

- Communicating with personnel encompassing:
 - Oral communications
 - Written procedures and work instructions
- Communicating with suppliers
- Communicating with customers

T2. Work activities records encompassing:

- Purpose and extent of maintaining work activities records in an enterprise
- Types of records for maintaining work activities in an enterprise
- Methods for recording and maintaining work records
- Work records required by regulation requirements

T3. Stock control methods encompassing:

- Enterprise purchasing policy
- Stock data base
- Purchase and sales entry mechanisms
- Reordering methods

T4. Using basic computers and applications encompassing:

- Starting up
- Selecting application
- Entering information
- Saving
- Printing

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

EVIDENCE GUIDE

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Receive and store materials and equipment for electrotechnology work as described in 8) including:
 - A Determining content and time of pending deliveries from relevant documentation.
 - B Dealing with discrepancies in deliveries.
 - C Storing and securing materials and equipment to prevent damage or loss.

EVIDENCE GUIDE

- D Forwarding documentation appropriately.
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to receiving and storing materials and equipment for electrotechnology work.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with any unit or units

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that require formal documentation.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to receiving and storing materials and equipment for a construction site or workshop store.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

Competency Field	11)
	Commercial

UEENEEC010B Deliver a service to customers

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers the interacting with customers to identify and meet their service needs. It encompasses following community and enterprise policies and standards, identifying customer needs, identifying and resolving problems/issues and maintaining product/service quality.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

There are no prerequisite competencies for this unit.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element.

Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Interact with customers.	1.1 Communication with customers is conducted in a professional and courteous manner according to established procedures.
	1.2 Customer enquiries are responded to promptly and politely and in accordance with established procedures.
	1.3 Personal dress and presentation is maintained in line with established procedures.
	1.4 Appropriate interpersonal skills are used to facilitate accurate and relevant exchange of information.
2 Identify customer needs.	2.1 Customer needs are assessed so that priorities for service delivery can be identified in accordance with established procedures.
	2.2 Appropriate questioning and active listening are used to determine customer needs.
	2.3 Customers are provided with information about available options for meeting their needs and assisted to identify their preferred option.
	2.4 Personal limitations in addressing customer needs are identified and where appropriate assistance is sought from appropriate personnel.
3 Deliver a service to customers.	3.1 Prompt customer service is provided to meet identified needs in accordance with established procedures.
	3.2 Service provided follows OHS policies and procedures and work is appropriately sequenced in accordance with requirements.
	3.3 Service provided is coordinated effectively with others involved on the work site.
	3.4 Customer complaints are handled sensitively and courteously in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA
	3.5 Opportunities to enhance the quality of service and products are identified and taken whenever possible.
4 Evaluate and complete service.	4.1 Own work is monitored and adjusted according to requirements for job quality, customer service and efficient resource use.
	4.2 Customer service records are inspected and verified after service is completed to ensure requirements are met.
	4.3 Appropriate personnel are notified of the completion of the repair work and details are documented in accordance with established procedures and requirements.
	4.4 Variations in the quality of service and/or products from required standards are detected and reported in accordance with established procedures.
	4.5 Additional information or follow-up action is completed in line with customer needs.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and delivering a service to customers.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EC010B Customer service

Evidence shall show an understanding of customer service to an extent indicated by the following aspects:

T1. Enterprise communication methods encompassing:

- Communicating with personnel encompassing:
 - Oral communications
 - Written procedures and work instructions
- Communicating with suppliers
- Communicating with customers

T2. Work activities records encompassing:

- Purpose and extent of maintaining work activities records in an enterprise
- Types of records for maintaining work activities in an enterprise
- Methods for recording and maintaining work records
- Work records required by regulation requirements

T3. Problem solving concepts and techniques encompassing:

- Identify problems - process and quality problems; equipment selection, availability and failure; teamwork and work allocation problems; safety and emergency situations and incident; performance gaps; profit improvement and the like.
- Mathematical Tools - average, standard deviation and the like.
- Use of analytical techniques in problem solving - brainstorming; fishbone diagrams/cause and effect diagrams; logic trees; process logic/process requirements; similarity/difference analysis; pare to analysis; force field/SWOT analysis.
- Using tools to assistance in problem solving - Procedures and work instructions; Safety data sheets; Job cards; Maintenance logs; Plant drawing.
- Determine corrective action:
 - Tools
 - Mode of communication procedure used within each enterprise

REQUIRED SKILLS AND KNOWLEDGE

- Established work procedures and policies
 - Size and structure of the teams/enterprise
 - Group goals - team, section, enterprise
 - Enterprise specific conflict resolution procedures
 - Action plans
 - Priority requirements
 - Measurable objectives
 - Resource requirements
 - Methods for reaching objectives
 - Timelines
 - Safety requirements
 - Risk assessment
 - Environmental requirements
 - Communicate recommendations - feedback requirements; corrective action and analysis; following up recommendations and the like.
 - Implement Monitoring encompassing:
 - Identifying components to be measured
 - Measurement and monitoring techniques
 - Measurement and monitoring tools
- T4. Enterprise customer relations protocols encompassing:
- Purpose of customer relations
 - Procedures for dealing with customers
 - Dealing with customer issues
- T5. Enterprise quality management system encompassing:
- Purpose of a quality system
 - Procedures pertaining to the relevant work function
 - Work instructions pertaining to the relevant work function
- T6. Instructing users in the use of specific items of equipment and systems encompassing:
- Methods for evaluating user needs - how equipment is used efficiently and safely and identifying wear and tear and damage to the equipment that requires repairing.
 - Basic instruction methods - be appropriate to the culture of the users and the equipment for which instruction is given.
 - Methods for evaluating user's ability use equipment correctly

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required

9.2)

Before the critical aspects of evidence are considered all

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to demonstrate competency in this unit

prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Deliver a service to customers as described in 8) including:
 - A Interacting with customers appropriately.
 - B Identifying customer needs accurately.
 - C Identifying and resolving customer issues promptly and amicably.
 - D Delivering a service.
 - E Reflecting on the completed service positively.
 - F Dealing with unplanned events by drawing on

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essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to delivering a service to customers.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with any unit or units that require formal documentation.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by delivering a service to customers in any of the electrotechnology disciplines.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

Competency Field	11)
	Commercial

UEENEED101A Use computer applications relevant to a workplace

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers the basic use of personal computers application relevant to a work function. It encompasses switching the computer on, applying user preferences, selecting basic applications, entering and retrieving information and printing files.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly

License to practice**3)**

related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health Safety regulations, codes and practices in the workplace.

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills****5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to use computer applications.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.</p> <p>1.2 Established OHS risk control measures and procedures in relation to computer and keyboard use are followed.</p> <p>1.3 Information required for the use of the application is obtained from appropriate sources.</p> <p>1.4 Computer is started up and desktop icons are manipulated to access desired application, directories and files.</p> <p>1.5 On-screen instructions in relation to any anomaly such as a virus warning are followed.</p> <p>1.6 Help directory is used to resolve any straightforward start up or access issues or anomalies.</p>
2 Use computer basic application.	<p>2.1 Established OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Information is added, altered or deleted as needed in accordance with application user instructions.</p> <p>2.3 Routine checks are made to ensure accuracy of information in accordance with quality requirements.</p>

ELEMENT	PERFORMANCE CRITERIA
3 Output information from an application.	3.1 Completed files are stored appropriately in accordance with enterprise requirements.
	3.2 Files are printed for a formal record and/or to forward to others.
	3.3 Files are sent via email in a readable format.
4 Shut down computer.	4.1 Files are named, arranged, saved and backed up in accordance with enterprise requirements.
	4.2 Computer shutdown procedures are followed and computer switched off.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices using basic computer applications relevant to a workplace.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ED101A Basic Computer Applications

Evidence shall show an understanding of computer use basics to an extent indicated by the following aspects:

- T1 Starting up
- T2 Selecting application
- T3 Entering information
- T4 Saving
- T5 Printing

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Use basic computer applications relevant to workplace as described in 8) and including:
 - A Correctly starting-up a computer.
 - B Dealing with anomalies appropriately.
 - C Following application instructions to input and output information.

- D Storing information appropriately.
- E Outputting information to a printer.
- F Forwarding information via email and/or web mail in a readable format.
- G Producing, storing and forwarding engineering related reports and/or results using at least three computer applications according to requirements
- H Shutting down a computer correctly
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency to produce, store and forward

engineering related reports and/or results using a range of computer applications.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall/may be demonstrated in relation to at least three of the following using computer applications to produce, store and forward engineering related reports and/or results at a basic level.

- Word processing
- Spread sheet
- Drawings
- Business management
- Apparatus set-up
- Note:

Apparatus set-up applications are invariably vendor specific and include icon-based integration and control applications.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Computer Systems

UEENEED104A Use engineering applications software on personal computers

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers the use of computer application relevant to engineering support work functions. It encompasses applying user preferences, using application menus and tools, entering and retrieve information, working with groups and transferring and printing files.

Note:

Examples of engineering application software are Visio, Electronic Work Bench, Lab View, Network Simulator.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health Safety regulations, codes and practices in the workplace

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to use computer applications.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.</p> <p>1.2 Established OHS risk control measures and procedures in relation to computer and keyboard use are followed.</p> <p>1.3 Application software and information required for use is obtained from appropriate sources.</p> <p>1.4 On-screen instructions in relation to any anomaly such as a virus warning are followed.</p> <p>1.5 Help menu is used to resolve any straightforward start up or access issues or anomalies.</p>
2 Use engineering application software.	<p>2.1 Established OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Techniques that apply to a particular software package are used to produce appropriate files.</p> <p>2.3 Routine checks are made to ensure accuracy of information in accordance with quality requirements.</p>
3 Output information from an application.	<p>3.1 Completed files are stored appropriately in accordance with enterprise requirements.</p> <p>3.2 Files are printed for formal records and/or forwarded to others.</p>

ELEMENT	PERFORMANCE CRITERIA
4 Shut down computer.	4.1 Files are named, arranged, saved and backed up in accordance with enterprise requirements.
	4.2 Computer shutdown procedures are followed and computer switched off.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices using engineering application software.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ED104A **software basic**

Personal computers, engineering applications

Evidence shall show an understanding of object orientated programming basics to an extent indicated by the following aspects:

T1 Computer Systems Overview encompassing:

- Safety
- Applications of computers in industry
- Types of computer systems
- Hardware components
- Software and firmware
- Memory
- Peripherals
- Removable storage devices
- PC hardware inventory
- Networking

T2 Operating System Overview encompassing:

- Software layer model
- Function and characteristics of an operating system
- File structure
- Formatting disks
- Boot process
- Configuration files

T3 Windows Operating System encompassing

- Windows screen
- Windows Explorer
- File management
- Managing software, updates, backups and virus protection.

T4 Word Processors encompassing

- Word files
- Formatting

REQUIRED SKILLS AND KNOWLEDGE

- Engineering symbols
- Tables and lists
- Drawings
- Spelling, grammar, and ‘search-and-replace’
- Printing

T5 Spreadsheets encompassing

- Parts of a spreadsheet
- Excel file management
- Inserting data into spreadsheets
- Formatting spreadsheets
- Charts
- Engineering problem solving
- Printing

T6 Databases encompassing:

- Features and purpose of database
- Searching existing database
- Creating a simple database
- Manipulating data in a database
- Advance sort functions
- Reports

T7 Transferring Data Between Windows Applications encompassing:

- Moving data between Word, Excel and Access

T8 Drawing and Computer Assisted Design (CAD) programs encompassing:

- Computer drawing using applications such as Visio.
- Incorporation of electrical/electronic symbols into computer drawings.

T9 E-mail and Internet Browsers encompassing:

- Browsers
- Search Engines
- Web-based e-mail (e.g. Hotmail)
- Application-based e-mail (e.g. Outlook).

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Use engineering applications software as described in 8) and including:
 - A Following application instructions to input and output information.
 - B Storing information appropriately.
 - C Outputting information to a printer.

- D Transferring information between systems.
- E Saving, storing and backing up files for effective retrieval by others.
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to using engineering application software.

Method of assessment 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to using at least two of the following types of engineering applications at a basic level.

- Office Applications
- Computer Aided Design
- Engineering data analysis software
- Engineering modelling
- Project management
- Network simulator
- Protocol analyser

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Computer Systems

UEENEED117A Install and configure network systems for internetworking

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This competency standard unit covers the interconnection of networks. It encompasses safe working practice, basic installation and configuration of routers and documenting installation and configuration activities.

Note:

This unit applies to all aspects of Electrotechnology - engineering applications only. For general competencies related Information Technologies refer to the latest endorsed IT Training Package.

Application of the Unit

Application of the Unit 2)

This competency standard unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships

License to practice 3)
and the like.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health Safety regulations, codes and practices in the workplace

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to install and configure internetworking systems.	<p>1.1 OHS processes and procedures for a given work area are obtained and understood.</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 The extent of internetworking to be installed and configured is determined from internetworking performance specifications and in consultations with relevant persons.</p> <p>1.4 Media and software required for internetworking is selected in accordance with organisation's established procedures.</p> <p>1.5 Network cabling test reports are obtained and reviewed to determine whether it complies with the required regulatory and performance standard.</p> <p>1.6 Activities are planned to meet scheduled timelines in consultation with others involved on the work.</p> <p>1.7 Appropriate development tools and software are selected based on specified requirements and performance standard.</p> <p>1.8 Strategies are implemented to ensure network development is carried out efficiently.</p>

ELEMENT	PERFORMANCE CRITERIA
2 Install and configure internetworking systems.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Knowledge of internetworking arrangements, subnetting and routing protocols are applied to installing and configuring routers and TCP/IP addresses.
	2.3 Routing protocols are selected and configured as per requirements specified for the internetworking systems.
	2.4 Common routing, TCP/IP and access malfunctions are identified and rectified using known solutions drawing knowledge of basic internetworking arrangements and protocol.
	2.5 Approaches to issues/problems are analysed to provide most effective solutions.
	2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.
3 Report install and configuring of internetworking systems.	3.1 Written justification is made for internetworking installation and configuring activities and appropriate person/s notified in accordance with established procedures.
	3.2 Network services records are maintained in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and configuring networking systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ED117A

Internet Networks

Evidence shall show an understanding of network basics to an extent indicated by the following aspects:

- T1 Calculate subnet addresses and masks
- T2 Layer 3 and 4 Protocols
- T3 Static and dynamic routing
- T4 Basic Router Configuration
- T5 Router Security
- T6 Router Boot Sequence
- T7 Router operating system management
- T8 Password Recovery
- T9 Router components and interfaces
- T10 Troubleshooting at all layers
- T11 Interior and Exterior routing protocols
- T12 Distance vector routing protocols
- T13 Link state routing protocols
- T14 Routing tables
- T15 Metrics used by routing protocols to find routes
- T16 Advantages and disadvantages of distance vector and link state routing protocols
- T17 Route summarisation

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UEE11”. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Install and configure networking systems as described in 8) and including:
 - A Establishing the extent of internetworking installation.
 - B Selecting appropriate internetworking media and software.

- C Determining whether network cabling is compliant.
- D Installing and configuring basic routing and TCP/IP protocols.
- E Calculate variable length subnet mask as per requirements specified for the internetworking systems.
- F Identifying common routing, TCP/IP and access malfunctions.
- G Applying known solutions to common routing, TCP/IP and access malfunctions.
- H Documenting internetworking installation and configuration activities.
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this competency standard unit.

Resources required to assess this unit are listed above in context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above in context of and specific

resources for assessment, evidence should show demonstrated competency in installing and configuring networking systems.

Method of assessment

9.4)

This competency standard unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to installing and configuring internetworking systems between two Local Area Networks (LANs) to form a Wide Area Network (WAN) or a LAN and the Internet.

Generic terms are used throughout this Vocational Standard shall be regarded as part of the Range of Variables in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
Computer Systems

UEENEEE083A Establish and follow a competency development plan in an electrotechnology engineering discipline

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers establishing and following a plan for one's own competency development. It encompasses establishing a plan in consultation with the enrolling registered training organisation (RTO), following industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, pursuing opportunities to develop competencies, to self-monitoring competency development and meeting obligations for periodic reporting of competency development activities.

Application of the Unit

Application of the Unit 4)

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 6

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable a contracts of training.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Establish a competency development plan	1.1 A competency development plan incorporating course work, assessment scheme and workplace activities is established in consultation with the enrolling RTO.
	1.2 Obligations and expectations of the competency development plan are obtained and understood.
2 Comply with engineering industry/enterprise workplace policies and procedures	2.1 Industry/enterprise workplace policies and procedures for all work activities are obtained and understood.
	2.2 Work instructions are followed, any clarification involved being sought from the immediate supervisor/appropriate person.
	2.3 Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.
3 Monitor and respond to a personal competency development plan.	3.1 All aspects of the competency development plan are confirmed in consultation with appropriate persons.
	3.2 All components of the competency development plan are followed diligently.
	3.3 Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.
	3.4 Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.
	3.5 Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.
	3.6 Modifications to the personal competency development plan are made in consultation with appropriate persons.
	3.7 Obligations are met for the regular and accurate reporting of competency development activities as per industry/enterprise policies and procedures.
	3.8 Periodic competency development activities report is validated by an appropriate person in accordance with

ELEMENT

PERFORMANCE CRITERIA

industry/enterprise policies and procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE083A

Engineering competency development

Evidence shall show an understanding of engineering competency development to an extent indicated by the following aspects:

T1 Components of a competency development plan encompassing:

- Competencies to be achieved
- Course work and timetable
- Assessment scheme
- Aspects of competency to be developed in the workplace
- Methods of monitoring and recording relevant workplace activities.

T2 Obligations and expectations under a competency development plan

T3 Scope for industry/enterprise policies and procedures

- Policies and procedure related to safety, effective work outcomes, customer relations, conflict resolution and competency development.
- Monitoring and reporting work activities.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of 9.1)

EVIDENCE GUIDE

Assessment

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this

EVIDENCE GUIDE

shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Participate in electrical work and competency development activities as described in 8) including:
 - A Establishing a competency development plan in consultation with the enrolling Registered Training Organisation (RTO).
 - B Understanding obligations and expectations of the competency development plan.
 - C Understand industry/enterprise workplace policies and procedures
 - D Following work instructions and seeking clarification of how particular work is to be carried out and the procedures involved.
 - E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person
 - F Reporting periodically the competency development activities in accordance with requirements
 - G Periodically reviewing progress of the competency development activities in accordance with requirements

EVIDENCE GUIDE

- H Pursuing strategies to develop opportunities for gaining the range of workplace experiences and exposure
- I Progressing successfully against periodic or staged evaluative performance events
- G Seeking assistance to overcome difficulties in developing competency
- K Dealing with unplanned events.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to participating in development and following a personal competency development plan.

EVIDENCE GUIDE

Method of assessment	9.4) This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'. Note: Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	9.5) This unit shall be assessed concurrently with other units in a qualification.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to other units in an advance diploma qualification to contribute the evidence used in evaluating when competency has been sufficiently demonstrated. The unit applies to both the educational program provided by a registered training organisation and real work under a formal training agreement.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Custom Content Section

Competency Field 5)
Commercial

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit specifies the mandatory requirements of occupational health and safety and how they apply to the various electrotechnology work functions. It encompasses responsibilities for health and safety, risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

This unit addresses information, processes and techniques for the application of general occupational health and safety requirements in workplaces and is essential for employees without managerial or supervisory responsibilities

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency. Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to enter a work area	1.1 Work area access permits are obtained from appropriate personnel according to established procedures
	1.2 Safe work methods for controlling risk obtained, read and understood prior to undertaking a work activity.
	1.3 Preparations for electrical and non-electrical isolation are carried out to prevent creation of hazards from loss of machine/system/process control according to established procedures.
	1.4 Tools and equipment needed for the work are checked for safety and correct functionality according to established procedures and regulatory requirements.
2 Apply safe working practices.	2.1 Safe work methods for controlling risk are followed accurately.
	2.2 Workplace procedures for dealing with accidents, fires and emergencies are followed according to work procedures and scope of responsibility and competencies.

ELEMENT

PERFORMANCE CRITERIA

- | | |
|---|---|
| 3. Follow workplace procedures for hazard identification and risk control | 3.1 Hazards are identified and control measures implemented and monitored through active participation in the consultation process with employer and other employees. |
| | 3.2 Hazards in the work area are recognised and reported to appropriate personnel according to established procedures. |
| | 3.3 OHS records of incidents are completed in accordance with regulatory requirements and established procedures. |
| | 3.4 Workplace instructions and training are followed accurately within established procedures. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and applying OHS practices in the workplace.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE101A Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects

T1 The basic legal requirements covering occupational health and safety in the workplace encompassing:

- underlying principles of OH&S
- general aims and objectives of the relevant state or territory legislation relating to OH&S.
- employer and employee responsibilities, rights and obligations.
- major functions of safety committees and representatives.
- powers given to Occupational Health and Safety Inspectors
- housekeeping and potential hazards in relation to improper housekeeping
- selecting appropriate personal protective equipment (PPE) given hazardous situations

T2 The work environment encompassing:

- typical hazards associated with a range of work environments
- procedures used to control the risks associated with these hazards
- principles of risk assessment / management and state the purpose of each.
- hierarchy of OH&S hazard control measures.
- required documentation for risk assessment.
- commonly used workplace safety signs.
- workplace emergencies that pose a threat to health and safety and suitable procedure for an emergency workplace evacuation.
- appropriate fire extinguisher for a given type of fire.
- requirements for the location, mounting and maintenance of portable fire extinguishers.
- basic process of fighting a fire.
- Importance of safe premises, buildings and security in an industrial setting and the consequences of non- compliance.

REQUIRED SKILLS AND KNOWLEDGE

- standard work procedure.

T3 Manual Handling encompassing:

- typical manual handling injuries and the effect they can have on lifestyle
- situations that may cause manual handling injuries
- correct procedures for lifting and carrying to prevent manual handling injuries

T4 Chemicals in the workplace encompassing:

- hazardous substances and dangerous goods.
- classification of chemicals as hazardous substances and/or dangerous goods
- requirements for labelling of chemicals in the workplace
- safe storage procedures for chemicals
- purpose and interpretation of material safety data sheet (MSDS)

T5 Working at heights encompassing:

- dangers associated with working on ladders and scaffolds
- identification of work area as a height risk and use appropriate safety equipment to prevent a fall
- selecting an appropriate ladder for a given situation and perform a safety check before use
- precautions that should be taken when ascending and working off a ladder
- precautions that should be taken when working on and around a scaffold and elevated platforms.

T6 Confined spaces encompassing:

- hazards associated with working in a confined space
- identifying workplace situations that could be classified as a confined space
- control measures for working in a designated confined space

T7 Physical and psychological hazards encompassing:

- short and long term effects of excessive noise and techniques to avoid damage to hearing due to excessive noise
- effects of vibration on the human body and work practices to protect against vibration
- effects of thermal stress on the human body and work practices to protect against thermal stress
- effects of ultraviolet (UV) radiation on the human body and work practices to protect against UV radiation.
- dangers associated with laser operated equipment and tools and suitable protective measures to overcome the danger.
- occupational overuse syndrome, how it occurs and means to overcome it
- factors that cause stress in the workplace, symptoms of a person suffering from stress and personal stress management techniques
- detrimental effects and dangers of drug and alcohol use in the workplace

REQUIRED SKILLS AND KNOWLEDGE

T8 Working safely with electricity encompassing:

- effects of electric shock on the human body
- common causes of electrical accidents
- precautions that can minimise the chance of electric shock (earthing, extra low voltage, fuses, circuit breakers and residual current devices – RCDs)
- protection offered by a residual current device (RCD)
- need for ensuring the (safe) isolation of an electrical supply
- appropriate method of removing an electric shock victim from a live electrical situation

T9 Life support - CPR in the workplace encompassing:

- First Aid.
- responsibilities of the First Aider.
- priorities of first aid management for any accident or injury.
- procedures required at an accident scene.
- legal and ethical issues, which may impact on the management of care.
- 'Duty of Care'.
- examination of a casualty for injuries.
- effect of cardio pulmonary arrest on the body.
- Managing simulated conditions of: airway obstruction; respiratory arrest and cardio pulmonary arrest,
- single and two-person cardio pulmonary resuscitation (CPR).
- signs and symptoms of an altered level of consciousness
- management of simulation of a casualty with an altered level of consciousness.
- signs and symptoms of shock.
- management of simulation of a casualty in shock

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to

EVIDENCE GUIDE

assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline,

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work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement encompassing:
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Applying OHS practices in the workplace as described in 8) and including:
 - A Preparing to enter the workplace including, the use of work permits and clearances and isolation permissions.
 - B Understanding and following risk control safe work methods.
 - C Applying work procedures and instructions as they apply to risk control measures.
 - D Dealing with accidents and emergencies within the scope of responsibility.
 - E Participation in consultation processes, identifying hazards and implementing and monitoring control measures.
 - F Dealing with unplanned events

EVIDENCE GUIDE

Note:

Ability to implement these Occupation Health and Safety measures shall be demonstrated on all occasions safety issues arise.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to applying OHS practices in the workplace.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

This unit shall be assessed concurrently, as it relates to other units undertaken in a possible skill clusters or qualification.

Components of this unit are included in the critical aspects of

EVIDENCE GUIDE

evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to each of the following

- Relevant Occupational Health and Safety legislation, regulations and codes of practice related to hazards present in the industry and particular workplace
- Accepted industry work procedures and the specific safety procedures and work instructions for particular workplace.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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Custom Content Section

Competency Field 5)

Electrotechnology

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers basic fitting and fabrication techniques as they apply in the various utilities industry work functions. It encompasses the safe use of hand, fixed and portable power tools; cutting, shaping joining and fixing using metallic and non-metallic materials; dismantling and assembling equipment; basic mechanical measurement and marking-out and reading drawings/diagrams.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101 Apply Occupational Health and Safety
A regulations, codes and practices in the
 workplace

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

4.1) General Application

This unit applies to persons entering work in utilities industry and may be used in school-based vocational programs.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for dismantling, assembling and fabrication work.	1.1 OHS procedures for a given work area are obtained and understood through established routines and procedures.
	1.2 Established OHS risk control measures and procedures

ELEMENT	PERFORMANCE CRITERIA
	in preparation for the work are followed.
	1.3 Safety hazard not previously identified are reported and advice on risk control measures is sought from the work supervisor.
	1.4 The nature of the work is obtained from documentation and from work supervisor to establish the scope of work to be undertaken.
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.6 Materials required for the work are obtained in accordance with established routines and procedures.
	1.7 Tools, equipment and measuring devices needed to carry out the work are obtained and checked for correct operation and safety.
	1.8 Cutting tools such as drills and chisels are sharpened to suit the material on which they are to be used.
2 Dismantle and assemble utilities industry apparatus.	<p>2.1 Established OHS risk control measures and procedures for carrying out the work are followed.</p> <p>2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.</p> <p>2.3 Appropriate tools are selected and used correctly and safely in dismantling and assembling apparatus.</p> <p>2.4 Manufacturer apparatus dismantling and assembling guides are used where applicable.</p> <p>2.5 Components are marked or tagged during the dismantling to help ensure correct and efficient reassembly.</p> <p>2.6 Dismantled components and parts are stored to protect them against loss or damage.</p> <p>2.7 Apparatus is dismantled and assembled efficiently without waste of materials and energy and/or damage to apparatus and the surrounding environment or services.</p>

ELEMENT	PERFORMANCE CRITERIA
	2.8 Procedures for referring non-routine events to immediate supervisor for directions are followed.
	2.9 Routine quality checks are carried out in accordance with work instructions.
	2.10 OHS risk control work completion measures and procedures are followed.
	2.11 Work site is cleaned and made safe in accordance with established procedures.
	2.12 Work supervisor is notified of the completion of the work in accordance with established procedures.
3 Fabricate utilities industry components.	3.1 Established OHS risk control measures and procedures for carrying out the work are followed.
	3.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	3.3 Appropriate tools are selected and used correctly and safely in fabricating components.
	3.4 Drawings and instruction for the fabrication of components are followed.
	3.5 Component dimensions are determined directly or by calculation from information given in job drawings and instructions.
	3.6 Components are fabricated efficiently without waste of materials and energy and/or damage to the surrounding environment or services.
	3.7 Procedures for referring non-routine events to immediate supervisor for directions are followed.
	3.8 Routine quality checks are carried out in accordance with work instructions.
	3.9 OHS risk control work completion measures and procedures are followed.
	3.10 Work site is cleaned and made safe in accordance with established procedures.

ELEMENT

PERFORMANCE CRITERIA

- 3.11 Work supervisor is notified of the completion of the work in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and fabricating, dismantling, assembling of utilities industry components.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE102A

Hand and power tools and their application

Evidence shall show an understanding of hand and power tools and their application to an extent indicated by the following aspects:

T1 Mechanical drawing interpretation and sketching encompassing:

- drawing standards and conventions used in drawings of mechanical components as specified in AS1100
- basic abbreviations and symbols used in drawing of mechanical components
- interpretation of mechanical drawings commonly used in the electrotechnology industry (orthogonal projection, third angle - detail and assembly drawings, pictorial views)
- laying out a drawing of mechanical components using engineering drawing convention.
- freehand drawings of mechanical components showing all information needed for its manufacture/fabrication

T2 Workshop planning and materials encompassing:

- methods used to work safely in an industrial work environment.
- typical non-electrical hazards in the workplace
- control measures for dealing with hazards identified.
- Conducting a risk assessment on a given work environment, documenting and assessing the risks identified
- type of metallic and non-metallic materials used in the electrotechnology industry and application of the common materials
- planning process

T3 Measuring and marking out encompassing:

- reasons for measuring and marking out
- tools used for marking out
- measuring and marking out a project accurately following correct procedures.
- sustainable energy work practices related to reducing waste when marking out.

REQUIRED SKILLS AND KNOWLEDGE

T4 Holding and cutting encompassing:

- common tools for holding (bench vices, multi-grips, vice grips, wrenches).
- common tools for cutting metallic and non-metallic material (hacksaws, wood saws, chisels, pliers, files)
- procedure for using a range of tools for cutting, shaping, and finishing metallic and non-metallic materials
- safety procedures when using holding and cutting tools

T5 Drills and drilling encompassing:

- types of drills used in the electrotechnology industry
- sharpening twist drills
- drilling metallic and non-metallic components
- safe use of a bench drill

T6 Tapping and threading encompassing:

- type and size of commonly used threads used in electrotechnology work
- taps and tap wrenches
- tapping metallic and non-metallic components
- stock and die tools
- threading metallic and non-metallic components

T7 General Hand Tools encompassing:

- hammers used in electrotechnology work
- screwdrivers used in electrotechnology work
- spanners and sockets used in electrotechnology work
- pliers used in electrotechnology work
- assembling components applicable to electrotechnology industry using a variety of hand tools.

T8 Joining techniques encompassing:

- types of machine screws and nuts
- forms of welding (Oxy-acetylene, electric arc welding).
- forms of brazing and hard soldering
- process of soft soldering
- joining components using machine screws
- joining components using welding, brazing or soldering techniques

T9 Portable electric power tools encompassing:

- portable electric power tools (grinders, drills, jigsaws, saws)
- applications of portable electric power tools used in the electrotechnology work.
- using portable power tools.
- fabricating components using power tools (drills, grinders)

REQUIRED SKILLS AND KNOWLEDGE

T10 Sheet metal work encompassing:

- types of sheet metal materials used in the electrotechnology work.
- names and applications of the types of fabrication materials.
- tools used with sheet metals in electrotechnology work (hacksaw, tinsnips, guillotines, punches, notching tools, folding machines)
- techniques used in fabricating sheet metal (cutting, bending, drilling/punching, joining, cutting mitres).
- marking out, cutting, bending, drilling and/or cutting and/or punching holes, joining and cutting mitred joints using sheet metal.
- sustainable energy work practices to reducing waste when fabricating using sheet metal.
- fabricating components using sheet metal and fabrication tools.

T11 Low tolerance measurement encompassing:

- tolerance
- techniques in using vernier callipers
- techniques in using micrometers.
- using vernier callipers to measure engineering components
- using micrometers to measuring engineering components

T12 Dismantling and assembly techniques encompassing:

- tools used in dismantling and assembling electrotechnology equipment (spanners, screwdrivers, bearing pullers, etc).
- procedures for ensuring the safe treatment of dismantled components.
- dismantling electrical, electronic, instrumentation or refrigeration/air conditioning piece of equipment using correct procedures.
- assembling electrical, electronic, instrumentation or refrigeration/air conditioning piece of equipment using correct procedures.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

EVIDENCE GUIDE

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline,

EVIDENCE GUIDE

work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Fabricate, dismantle, assemble of utilities industry components as described in 8) and including:
 - A Selecting and using hand tools appropriate to a task correctly and safely
 - B Selecting and using power tools appropriate to a task correctly and safely
 - C Sharpening at least two drill bits each for use different types of material.
 - D Interpreting mechanical drawings/diagrams and instructions correctly.
 - E Dismantle and assemble an apparatus relevant to utilities industry discipline in which competency is sought.
 - F Fabricate a component relevant to the utilities industry discipline in which competency is sought.
 - G Dealing with unplanned events

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to dismantling, assembling and fabricating utilities industry components.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installation, fault finding, maintenance, repair or development work functions in any of the following disciplines:

- Electrotechnology Disciplines
- Gas industry Disciplines
- ESI Transmission, Distribution and Rail Disciplines
- ESI Generation Disciplines

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.3) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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2.3) Literacy and numeracy skills

Competency Field 5)

Utilities industry

UEENEEE103A Solve problems in ELV single path circuits

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers providing known solutions to predictable problems in single path circuits operated at extra-low voltage (ELV) as they apply to various energy sector work functions. It encompasses working safely, problem solving procedures, including the use of basic voltage, current and resistance measuring devices, providing known solutions to predictable circuit problems.

Application of the Unit

Application of the Unit 2)

This unit shall apply to persons entering work in the energy sector and may be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However they are subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to work on extra-low voltage single path electrical circuits.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve problem in extra-low voltage single path electrical circuits.	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established routines are used to solve circuit problems using measured and calculated values

ELEMENT	PERFORMANCE CRITERIA
3 Complete work and document problem solving activities.	<p>as they apply to single path, single source circuits.</p> <p>2.5 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.</p> <p>3.1 OHS work completion risk control measures and procedures are followed.</p> <p>3.2 Work site is cleaned and made safe in accordance with established procedures.</p> <p>3.3 Justification for solutions used to solve circuit problems is documented.</p> <p>3.4 Work completion is documented and appropriate person(s) notified in accordance with established routine procedures.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in extra-low voltage single path circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE103A

Single Path d.c. Circuits

Evidence shall show an understanding of single path d.c. circuits to an extent indicated by the following aspects:

T1 Basic electrical concepts encompassing:

- electrotechnology industry
- static and current electricity
- production of electricity by renewable and non renewable energy sources
- transportation of electricity from the source to the load via the transmission and distribution systems
- utilisation of electricity by the various loads
- basic calculations involving quantity of electricity, velocity and speed with relationship to the generation and transportation of electricity.

T2 Basic electrical circuit encompassing:

- symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in a circuit diagram
- purpose of each component in the circuit
- effects of an open-circuit, a closed-circuit and a short-circuit
- multiple and sub-multiple units

T3 Ohm's Law encompassing:

- basic d.c. single path circuit.
- voltage and currents levels in a basic d.c. single path circuit.
- effects of an open-circuit, a closed-circuit and a short-circuit on a basic d.c. single path relationship between voltage and current from measured values in a simple circuit
- determining voltage, current and resistance in a circuit given any two of these quantities
- graphical relationships of voltage, current and resistance
- relationship between voltage, current and resistance

T4 Electrical power encompassing:

- relationship between force, power, work and energy
- power dissipated in circuit from voltage, current and resistance values

REQUIRED SKILLS AND KNOWLEDGE

- power ratings of devices
- measurement electrical power in a d.c. circuit
- effects of power rating of various resistors

T5 Effects of electrical current encompassing:

- physiological effects of current and the fundamental principles (listed in AS/NZS 3000) for protection against the this effect
- basic principles by which electric current can result in the production of heat; the production of magnetic fields; a chemical reaction
- typical uses of the effects of current
- mechanisms by which metals corrode
- fundamental principles (listed in AS/NZS3000) for protection against the damaging effects of current

T6 EMF sources energy sources and conversion electrical energy encompassing:

- basic principles of producing a emf from the interaction of a moving conductor in a magnetic field.
- basic principles of producing an emf from the heating of one junction of a thermocouple.
- basic principles of producing a emf by the application of sun light falling on the surface of photovoltaic cells
- basic principles of generating a emf when a mechanical force is applied to a crystal (piezo electric effect)
- principles of producing a electrical current from primary, secondary and fuel cells
- input, output, efficiency or losses of electrical systems and machines
- effect of losses in electrical wiring and machines
- principle of conservation of energy

T7 Resistors encompassing:

- features of fixed and variable resistor types and typical applications
- identification of fixed and variable resistors
- various types of fixed resistors used in the Electro technology Industry. e.g. wire-wound, carbon film, tapped resistors.
- various types of variable resistors used in the Electro technology Industry e.g. adjustable resistors: potentiometer and rheostat; light dependent resistor (LDR); voltage dependent resistor (VDR) and temperature dependent resistor (NTC, PTC).
- characteristics of temperature, voltage and light dependent resistors and typical applications of each
- power ratings of a resistor.
- power loss (heat) occurring in a conductor.
- resistance of a colour coded resistor from colour code tables and confirm the value by measurement.
- measurement of resistance of a range of variable' resistors under varying

REQUIRED SKILLS AND KNOWLEDGE

conditions of light, voltage, temperature conditions.

- specifying a resistor for a particular application.

T8 Series circuits encompassing:

- circuit diagram of a single-source d.c. 'series' circuit.
- Identification of the major components of a 'series' circuit: power supply; loads; connecting leads and switch
- applications where 'series' circuits are used in the Electro technology industry.
- characteristics of a 'series' circuit - connection of loads, current path, voltage drops, power dissipation and affects of an open circuit in a 'series' circuit.
- the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities
- relationship between voltage drops and resistance in a simple voltage divider network.
- setting up and connecting a single-source series dc circuit
- measurement of resistance, voltage and current values in a single source series circuit
- effect of an open-circuit on a series connected circuit

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency

in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range

statement

- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Solve problems in extra-low voltage single path circuits as described in 8) and including:

- | | |
|---|--|
| A | Determining the operating parameters of an existing circuit. |
| B | Altering an existing circuit to comply with specified operating parameters. |
| C | Developing circuits to comply with a specified function and operating parameters. |
| D | Identifying loss of supply. |
| E | Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items. |

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment

environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solve problems in extra-low voltage single path circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Single source single path circuits as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following disciplines:
 - Computers
 - Data Communications
 - Electrical
 - Electronics
 - Fire protection
 - Instrumentation
 - Refrigeration and Air Conditioning,
 - Renewable and sustainable energy systems, and
 - Security technology
- In relation to at least three of the following types of circuit problems and on at least two occasions:
 - Determining the operating parameters of an existing circuit
 - Identifying and locating open-circuits
 - Identifying and locating short-circuits
 - Identifying loss of supply

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

UEENEEE104A Solve problems in d.c. circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers determining correct operation of single source d.c. series, parallel and series-parallel circuits and providing solutions as they apply to various electrotechnology work functions. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in single and multiple path circuits.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101 Apply Occupational Health and Safety
A regulations, codes and practices in the
 workplace

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare to work on d.c. electrical circuits.	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	OHS risk control work preparation measures and procedures are followed.

ELEMENT	PERFORMANCE CRITERIA
	1.3 The nature of the circuit problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve d.c. circuit problems.	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established methodological techniques are used to solve d.c. circuit problems from measure and calculated values as they apply to electrical circuit.
	2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to solve circuit problems is documented.

ELEMENT**PERFORMANCE CRITERIA**

- 3.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in d.c. circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE104A

Direct current circuits

Evidence shall show an understanding of electrical fundamentals and direct current multiple path circuits to an extent indicated by the following aspects:

T1 Basic electrical concepts encompassing:

- electrotechnology industry
- static and current electricity
- production of electricity by renewable and non renewable energy sources
- transportation of electricity from the source to the load via the transmission and distribution systems
- utilisation of electricity by the various loads
- basic calculations involving quantity of electricity, velocity and speed with relationship to the generation and transportation of electricity.

T2 Basic electrical circuit encompassing:

- symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in a circuit diagram
- purpose of each component in the circuit
- effects of an open-circuit, a closed-circuit and a short-circuit
- multiple and sub-multiple units

T3 Ohm's Law encompassing:

- basic d.c. single path circuit.
- voltage and currents levels in a basic d.c. single path circuit.
- effects of an open-circuit, a closed-circuit and a short-circuit on a basic d.c. single path relationship between voltage and current from measured values in a simple circuit
- determining voltage, current and resistance in a circuit given any two of these quantities
- graphical relationships of voltage, current and resistance
- relationship between voltage, current and resistance

REQUIRED SKILLS AND KNOWLEDGE

T4 Electrical power encompassing:

- relationship between force, power, work and energy
- power dissipated in circuit from voltage, current and resistance values
- power ratings of devices
- measurement electrical power in a d.c. circuit
- effects of power rating of various resistors

T5 Effects of electrical current encompassing:

- physiological effects of current and the fundamental principles (listed in AS/NZS 3000) for protection against the this effect
- basic principles by which electric current can result in the production of heat; the production of magnetic fields; a chemical reaction
- typical uses of the effects of current
- mechanisms by which metals corrode
- fundamental principles (listed in AS/NZS3000) for protection against the damaging effects of current

T6 EMF sources energy sources and conversion electrical energy encompassing:

- basic principles of producing a emf from the interaction of a moving conductor in a magnetic field.
- basic principles of producing an emf from the heating of one junction of a thermocouple.
- basic principles of producing a emf by the application of sun light falling on the surface of photovoltaic cells
- basic principles of generating a emf when a mechanical force is applied to a crystal (piezo electric effect)
- principles of producing a electrical current from primary, secondary and fuel cells
- input, output, efficiency or losses of electrical systems and machines
- effect of losses in electrical wiring and machines
- principle of conservation of energy

T7 Resistors encompassing:

- features of fixed and variable resistor types and typical applications
- identification of fixed and variable resistors
- various types of fixed resistors used in the Electro technology Industry. e.g. wire-wound, carbon film, tapped resistors.
- various types of variable resistors used in the Electro technology Industry e.g. adjustable resistors: potentiometer and rheostat; light dependent resistor (LDR); voltage dependent resistor (VDR) and temperature dependent resistor (NTC, PTC).
- characteristics of temperature, voltage and light dependent resistors and typical applications of each
- power ratings of a resistor.
- power loss (heat) occurring in a conductor.

REQUIRED SKILLS AND KNOWLEDGE

- resistance of a colour coded resistor from colour code tables and confirm the value by measurement.
- measurement of resistance of a range of variable resistors under varying conditions of light, voltage, temperature conditions.
- specifying a resistor for a particular application.

T8 Series circuits encompassing:

- circuit diagram of a single-source d.c. 'series' circuit.
- Identification of the major components of a 'series' circuit: power supply; loads; connecting leads and switch
- applications where 'series' circuits are used in the Electro technology industry.
- characteristics of a 'series' circuit - connection of loads, current path, voltage drops, power dissipation and affects of an open circuit in a 'series' circuit.
- the voltage, current, resistances or power dissipated from measured or given values of any two of these quantities
- relationship between voltage drops and resistance in a simple voltage divider network.
- setting up and connecting a single-source series dc circuit
- measurement of resistance, voltage and current values in a single source series circuit
- effect of an open-circuit on a series connected circuit

T9 Parallel circuits encompassing:

- schematic diagram of a single-source d.c. 'parallel' circuit.
- major components of a 'parallel' circuit (power supply, loads, connecting leads and switch)
- applications where 'parallel' circuits are used in the Electrotechnology industry.
- characteristics of a 'parallel' circuit. (load connection, current paths, voltage drops, power dissipation, affects of an open circuit in a 'parallel' circuit).
- relationship between currents entering a junction and currents leaving a junction
- relationship between branch currents and resistances in a two branch current divider network.
- calculation of the total resistance of a 'parallel' circuit.
- calculation of the total current of a 'parallel' circuit.
- Calculation of the total voltage and the individual voltage drops of a 'parallel' circuit.
- setting up and connecting a single-source d.c. parallel circuit
- resistance, voltage and current measurements in a single-source parallel circuit
- voltage, current, resistance or power dissipated from measured values of any of these quantities
- output current and voltage levels of connecting cells in parallel.

T10 Series/parallel circuits encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- schematic diagram of a single-source d.c. 'series/parallel' circuit.
- major components of a 'series/parallel' circuit (power supply, loads, connecting leads and switch)
- applications where 'series/parallel' circuits are used in the Electrotechnology industry.
- characteristics of a 'series/parallel' circuit. (load connection, current paths, voltage drops, power dissipation, affects of an open circuit in a 'series/parallel' circuit).
- relationship between voltages, currents and resistances in a bridge network.
- calculation of the total resistance of a 'series/parallel' circuit.
- calculation of the total current of a 'series/parallel' circuit.
- calculation of the total voltage and the individual voltage drops of a 'series/parallel' circuit.
- setting up and connecting a single-source d.c. series/ parallel circuit
- resistance, voltage and current measurements in a single-source d.c. series / parallel circuit
- the voltage, current, resistances or power dissipated from measured values of any two of these quantities

T11 Factors affecting resistance encompassing:

- four factors that affect the resistance of a conductor (type of material, length, cross-sectional area and temperature)
- affect the change in the type of material (resistivity) has on the resistance of a conductor.
- affect the change in 'length' has on the resistance of a conductor.
- affect the change in 'cross-sectional area' has on the resistance of a conductor.
- effects of temperature change on the resistance of various conducting materials
- effects of resistance on the current-carrying capacity and voltage drop in cables.
- calculation of the resistance of a conductor from factors such as conductor length, cross-sectional area, resistivity and changes in temperature
- using digital and analogue ohmmeter to measure the change in resistance of different types of conductive materials (copper, aluminium, nichrome, tungsten) when those materials undergo a change in type of material length, cross-sectional area and temperature.

T12 Effects of meters in a circuit encompassing:

- selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application.
- measuring resistance using direct, volt-ammeter and bridge methods.
- instruments used in the field to measure voltage, current, resistance and insulation resistance and the typical circumstances in which they are used.
- hazards involved in using electrical instruments and the safety control measures that should be taken.
- operating characteristics of analogue and digital meters.

REQUIRED SKILLS AND KNOWLEDGE

- correct techniques to read the scale of an analogue meters and how to reduce the ‘parallax’ error.
- types of voltmeters used in the Electrotechnology industry – bench type, clamp meter, Multimeter, etc.
- purpose and characteristics (internal resistance, range, loading effect and accuracy) of a voltmeter.
- types of voltage indicator testers. e.g. LED, neon, solenoid, volt-stick, series tester, etc. and explain the purpose of each voltage indicator tester.
- operation of various voltage indicator testers.
- advantages and disadvantages of each voltage indicator tester.
- various types of ammeters used in the Electrotechnology industry – bench, clamp meter, multimeter, etc.
- purpose of an ammeter and the correct connection (series) of an ammeter into a circuit.
- reasons why the internal resistance of an ammeter must be extremely low and the dangers and consequences of connecting an ammeter in parallel and/or wrong polarity.
- selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application
- connecting an analogue/digital voltmeter into a circuit ensuring the polarities are correct and take various voltage readings.
- loading effect of various voltmeters when measuring voltage across various loads.
- using voltage indicator testers to detect the presence of various voltage levels.
- connecting analogue/digital ammeter into a circuit ensuring the polarities are correct and take various current readings.

T13 Resistance measurement encompassing:

- Identification of instruments used in the field to measure resistance (including insulation resistance) and the typical circumstances in which they are used.
- the purpose of an Insulation Resistance (IR) Tester.
- the parts and functions of various analogue and digital IR Tester (selector range switch, zero ohms adjustment, battery check function, scale and connecting leads).
- reasons why the supply must be isolated prior to using the IR tester.
- where and why the continuity test would be used in an electrical installation.
- where and why the insulation resistance test would be used in an electrical installation.
- the voltage ranges of an IR tester and where each range may be used. e.g. 250 V d.c, 500 V d.c and 1000 V d.c
- AS/NZS3000 Wiring Rules requirements – continuity test and insulation resistance (IR) test.
- purpose of regular IR tester calibration.
- the correct methods of storing the IR tester after use
- carry out a calibration check on a IR Tester

REQUIRED SKILLS AND KNOWLEDGE

- measurement of low values of resistance using an IR tester continuity functions.
- measurement of high values of resistance using an IR tester insulation resistance function.
- volt-ammeter (short shunt and long shunt) methods of measuring resistance.
- calculation of resistance values using voltmeter and ammeter reading (long and short shunt connections)
- measurement of resistance using volt-ammeter methods

T14 Capacitors and Capacitance encompassing:

- basic construction of standard capacitor, highlighting the: plates, dielectric and connecting leads
- different types of dielectric material and each dielectric's relative permittivity.
- identification of various types of capacitors commonly used in the Electrotechnology industry (fixed value capacitors -stacked plate, rolled, electrolytic, ceramic, mica and Variable value capacitors – tuning and trimmer)
- circuit symbol of various types of capacitors: standard; variable, trimmer and polarised
- terms: Capacitance (C), Electric charge (Q) and Energy (W)
- unit of: Capacitance (Farad), Electric charge (Coulomb) and Energy (Joule)
- factors affecting capacitance (the effective area of the plates, the distance between the plates and the type of dielectric) and explain how these factors are present in all circuits to some extent.
- how a capacitor is charged in a d.c. circuit.
- behaviour of a series d.c. circuit containing resistance and capacitance components. - charge and discharge curves
- the term 'Time Constant' and its relationship to the charging and discharging of a capacitor.
- calculation of quantities from given information: Capacitance ($Q = VC$); Energy ($W = \frac{1}{2}CV^2$); Voltage ($V = Q/C$)
- calculation one time constant as well as the time taken to fully charge and discharge a given capacitor. ($\tau = RC$)
- connection of a series d.c. circuit containing capacitance and resistor to determine the time constant of the circuit

T15 Capacitors in Series and Parallel encompassing:

- hazards involved in working with capacitance effects and the safety control measures that should be taken.
- safe handling and the correct methods of discharging various size capacitors
- dangers of a charged capacitor and the consequences of discharging a capacitor through a person
- factors which determine the capacitance of a capacitor and explain how these factors are present in all circuits to some extent.
- effects of capacitors connected in parallel by calculating their equivalent capacitance.

REQUIRED SKILLS AND KNOWLEDGE

- effects on the total capacitance of capacitors connected in series by calculating their equivalent capacitance.
- Connecting capacitors in series and/or parallel configurations to achieve various capacitance values.
- common faults in capacitors.
- testing of capacitors to determine serviceability.
- application of capacitors in the Electrotechnology industry.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to

EVIDENCE GUIDE

be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Solving problems in d.c. circuits as described in 8) and including:
 - A Using methodological techniques to solve d.c. circuit problems from measure and calculated values
 - B Determining the operating parameters of an existing circuit.
 - C Altering an existing circuit to comply with specified operating parameters.
 - D Developing circuits to comply with a specified function and operating parameters.
 - E Dealing with unplanned events

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in d.c. circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to single source series, parallel and series-parallel d.c. circuits as they apply to problems related to installation, fault finding, maintenance or development work functions and at least two of the following types of circuit problems and on more than one occasions:

- Determining the operating parameters of an existing circuit
- Altering an existing circuit to comply with specified operating parameters
- Developing circuits to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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2.2) Literacy and numeracy skills

Competency Field 5)

Electrotechnology

UEENEEE105A Fix and secure electrotechnology equipment

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers fixing, securing and mounting techniques as apply in the various electrotechnology work functions. It encompasses the safe use of hand and portable power tools, safe lifting techniques, safe use of ladders and elevated platforms and the selection and safe application of fixing devices and supporting accessories/equipment.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|--------------------------------------|-----|---|
| 1 | Prepare to fix and secure equipment. | 1.1 | OHS procedures for a given work area are identified, obtained and understood. |
| | | 1.2 | OHS risk control work preparation measures and procedures are followed. |

ELEMENT	PERFORMANCE CRITERIA
	<p>1.3 The scope of work to be undertaken is obtained from documentation or from work supervisor.</p> <p>1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.</p> <p>1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.</p> <p>1.6 Fixing devices are selected for their suitable ability for the environment, the load they are to support and substratum's into which they are to be installed.</p> <p>1.7 Supporting accessories/equipment is selected for suitability for the environment and ability to support and protect from damage that which they are intended to support.</p> <p>1.8 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.</p>
2 Install fixing and support devices.	<p>2.1 Electrical isolation is arranged where work is within arm's reach of exposed conductive parts, plant or machinery in strict accordance OHS requirements and procedures.</p> <p>2.2 Other OHS risk control measures relevant to the work site are followed.</p> <p>2.3 Fixing devices are installed in accordance with manufacturer instructions.</p> <p>2.4 Support accessories/equipment is install accurately and to comply with technical standards and job specifications.</p> <p>2.5 Work is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.</p>
3 Complete fixing and support work.	<p>3.1 OHS risk control work completion measures and procedures are followed.</p> <p>3.2 Work site is tidied and tools and equipment cleaned</p>

ELEMENT

PERFORMANCE CRITERIA

and securely stored.

3.3 Appropriate personnel are notified of the work completion.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and fixing and securing equipment.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

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Fixing and support devices/techniques

Evidence shall show an understanding of accessories and support and fixing device and methods and their use to an extent indicated by the following aspects:

T1. Device for securing and mounting
electrical/electronic/instrumentation/refrigeration/
air-conditioning/telecommunications accessories for supporting, fixing and protecting
wiring/cabling/piping and functional accessories to hollow walls encompassing:

- types and safe application of devices for hollow wall fixing and support
- methods/techniques used to fix/support to wood, hollow wall, masonry blocks, plasterboard, panelling
- types and safe application of fixing devices used in the electrotechnology industry for wood and hollow wall structures (wood screws, coach bolts, self-tappers, self drilling, metal thread, hollow wall anchors, behind plaster brackets, stud brackets, plasterboard devices, toggle devices)
- types of tools used for hollow wall fixing and supporting.
- using various fixing methods to fix/support to hollow walls.

T2. Device for securing and mounting
electrical/electronic/instrumentation/refrigeration/
air-conditioning/telecommunications accessories for supporting, fixing and protecting
wiring/cabling/piping and functional accessories to solid walls encompassing:

- types and safe application of devices used for solid wall fixing and support
- methods/techniques used in to fix to masonry and concrete structures
- fixing devices used in the electrotechnology industry for solid wall structures (wall-plugs, expanding concrete fixing devices, gas powered fixing tools, powder actuated fixing tools, loxins, dynabolts, chemical devices)
- regulatory requirements for use of powder fixing tools.
- hand and power tools used in fixing and supporting accessories
- using various fixing methods to fix/support to solid walls

T3. Device for securing and mounting

REQUIRED SKILLS AND KNOWLEDGE

electrical/electronic/instrumentation/refrigeration/
air-conditioning/telecommunications accessories for supporting, fixing and protecting
wiring/cabling/piping and functional accessories to metal fixing encompassing:

- accessories that may be fixed to metal (saddle clips, conduits, brackets, switches)
- techniques for fixing to metal
- fixing devices: coach bolts, self-tappers, metal thread bolts, hollow wall anchors, rivets
- fixing tools - spanners, screwdrivers, power screw drivers, pop riveters, files, reamers
- OH&S issues related to drilling, cutting, eye protection, metal filings, swarf, noise
- Using power drills, drill bits, change drill speeds.
- Install a fixing device and accessory capable of supporting up to 20 kg on the metal plate.

T4. Securing and mounting electrical/electronic/instrumentation/refrigeration/
air-conditioning/telecommunications accessories for supporting, fixing and protecting
wiring/cabling/piping and functional accessories using fixing adhesives and tapes
encompassing:

- types and safe application of using adhesives and tapes as fixing devices (load limits of different commercial products)
- accessories that may be fixed using adhesives and tapes
- techniques for the application of adhesives and tapes
- tools used to apply and cut adhesives and tapes
- hazards and safety measures when working with adhesives and chemical fixing devices (fumes, cutting, eye protection, physical contact, hand protection, ingestion)

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably

EVIDENCE GUIDE

gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Fix and secure electrical equipment as described in 8) and including:
 - A Selecting fixing for loads of < 5 kg, < 20 kg and < 50 kg and suitable for the environment in which they are to be installed.
 - B Installing fixing devices in compliance with manufacturers instructions
 - C Installing appropriate devices for fixing to a hollow wall, brick, concrete and steel.
 - D Installing fixing support accessories/equipment relevant the discipline in which competency is sought.
 - E Dealing with unplanned events

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to fixing and securing electrical equipment.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering other installation competencies.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installation, fault finding, maintenance or development work functions in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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2.2) Literacy and numeracy skills

Competency Field 5)

Electrotechnology

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the use of drawings, diagrams, cable schedules, standards, codes and specifications as they apply to the various electrotechnology work functions. It encompasses the rudiments for communicating with schematic, wiring and mechanical diagrams and equipment and cable/connection schedules, manuals, site and architectural drawings and plans showing the location of services, apparatus, plant and machinery and understanding the use and format of compliance standards and job specifications.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101 Apply Occupational Health and Safety
A regulations, codes and practices in the
workplace

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to use drawings, diagrams, schedules and manuals.	1.1 Established OHS risk control measures and procedures are followed.
	1.2 The need for drawings, diagrams, schedules or manuals is determined from the nature of the work to be undertaken.

ELEMENT	PERFORMANCE CRITERIA
2 Use drawings, diagrams, schedules and manuals to obtain job information.	<p>1.3 Established routines and procedures are followed to obtain drawings, diagrams, schedules or manuals required for the work to be undertaken.</p> <p>2.1 Drawings, diagrams, schedules and/or manuals are selected, appropriate to the work being undertaken.</p> <p>2.2 Drawings, diagrams and schedules are interpreted using knowledge of drawing layouts, conventions and symbols.</p> <p>2.3 Dimensions are extracted from drawings and diagrams for application to work undertaken.</p> <p>2.4 Location of equipment is determined from equipment schedules and location diagrams.</p> <p>2.5 Manuals are reviewed to ascertain their format and where information relevant to the work to be undertaken is located.</p> <p>2.6 Information given in manuals is interpreted in relation to the work to be undertaken.</p>
3 Use drawings, diagrams, schedules and manuals to convey information and ideas.	<p>3.1 Drawing conventions are used in neat freehand drawings to convey information and ideas to others involved in the work to be undertaken.</p> <p>3.2 Drawing conventions are used to neatly correct freehand original job drawing to show final 'as-installed' arrangement.</p> <p>3.3 Corrected drawings are forwarded to appropriate person(s) in accordance with established procedures.</p>
4 Prepare to use compliance standards, codes and specifications.	<p>4.1 Compliance Standards and Codes that apply to particular disciplines are sought and obtained.</p> <p>4.2 The format of compliance Standards and Codes that apply to particular disciplines are reviewed and understood.</p> <p>4.3 The purpose and format and typical content of job specifications are reviewed and understood.</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and using drawings, diagrams, cable schedules, standards, codes and specifications.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE107A

Drawings, diagrams and schedules

Evidence shall show an understanding of drawings, diagrams and schedules used in electrotechnology work to an extent indicated by the following aspects:

T1 Architectural drawings encompassing:

- site plans, floor plans detailed drawings and standard drawings
- architectural floor plan to determine the power and lighting or communications / audio/video layouts required in a domestic installation
- site plan to locate the service point, consumers mains, communication services, main switchboard, distribution boards and/or builders supplies.
- standard drawing scales to determine the actual lengths represented by dimensions on an architectural drawing.
- reading and interpretation of floor plans to determine the location of the electrical/communication/audio accessories and appliances.
- Australian standard symbols used on floor plans to show the location of the accessories and appliances as detailed in an electrical schedule.

T2 Electrical drawings encompassing:

- types of electrical drawings: block, circuit, wiring and ladder diagrams
- purpose and application of block, circuit, wiring diagrams and ladder diagrams
- Australian standard symbols used to represent components on electrical diagrams.
- conventions used in and the features of circuit diagrams
- converting a circuit diagram to a wiring diagram
- identification of cable type, origin and route from a cable schedule.
- developing a cable schedule for a given installation.

T3 Circuit diagrams encompassing:

- purpose of circuit diagrams in the electrotechnology industry
- conventions used in and the features of circuit diagrams
- sketching basic circuit diagrams
- common symbols used in circuit diagram (Australian Drawing Standard AS/NZS 1102)

REQUIRED SKILLS AND KNOWLEDGE

- developing switching charts to identify the terminals of various types of switches
- connecting equipment using circuit diagrams.

T4 Wiring diagrams encompassing:

- purpose of wiring diagrams in the electrotechnology industry
- conventions used in and the features of wiring diagrams
- sketching basic wiring diagrams
- common symbols used in wiring diagram (Australian Drawing Standard AS/NZS 1102)
- connecting equipment using wiring diagrams.

T5 Building construction drawings and diagrams encompassing:

- building types: timber frame, brick veneer, double brick and metal frame.
- identification of different types of: footings, floors, external walls, roofs, interior walls
- typical cable routes through buildings, structures and premises
- sequence of each constructional stage for brick, brick veneer and timber cottages
- identification of the stages at which the electrical/communications - first and second fixing occurs in the constructional sequence
- areas of cooperation between electrical/communications and other building trades

KS02-EE107A standards and codes

Introduction to regulations, compliance

Evidence shall show an understanding of regulations, compliance standards and codes that apply to electrical work to an extent indicated by the following aspects:

T1 Regulation for undertaking electrical work encompassing:

- scope of work covered by licensing in the electrotechnology industry (Electrical licensing)
- legislative requirements for ensuring electrical or electronic equipment is safe i.e. compliance requirements of electrical installations

T2 Standards philosophy and format encompassing:

- performance verses prescriptive requirements
- purpose of technical standards and their development
- role of standards Australia/New Zealand, International Organisation for Standardisation (ISO) and the International Electrotechnical Commission (IEC)
- how standards are used in compulsory and accreditation compliance schemes.
- arrangement and use of technical standards in relation to electrical and electronic work
- how to read and apply a standard.
- Standards and codes that apply to all types of electrical installations
- Standards include Standards mandated under regulation (e.g. Wiring Rules) or by an authority, deemed-to-comply standard and local service requirements (e.g. Service rules).
- Codes include those applicable to electrical safe working practices and some aspects of

REQUIRED SKILLS AND KNOWLEDGE

the Building Code of Australia.

T3 Purpose, format and content of typical job specifications encompassing:

- NATSPEC specification system - provide the most common templates on which job specification are written.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and

EVIDENCE GUIDE

operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Use drawings, diagrams, schedules, standards, codes and specifications as described in 8) Range and including:
 - A Identifying drawings, diagrams, schedules and manuals relevant to the work to be undertaken.
 - B Interpreting drawings, diagrams, schedules and manuals correctly.

EVIDENCE GUIDE

- C Using correct conventions in freehand drawings.
- D Giving correct information in freehand drawings.
- E Obtaining compliance Standards and Codes applicable to particular disciplines
- F Reviewing and understanding the format of compliance Standards and Codes that apply to particular disciplines
- G Reviewing the format and content of typical job specifications.
- H Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to using drawings, diagrams, schedules and manuals.

EVIDENCE GUIDE

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering the use of drawings, diagrams, schedules, standards, codes or specifications is required.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to assembly, installation, fault finding, maintenance or development work functions in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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Custom Content Section

Competency Field 5)

Electrotechnology

UEENEEE108A Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers the laying of wiring/cabling, connection of accessories and continuity and insulation resistance testing of circuits intended to operate at extra-low voltage. Typically this includes circuits and accessories for ELV powered devices, security, controls, integrated systems, audio/video systems. It encompasses the principles of single source, single load power circuits, control circuits and communications circuits, safe working practices and following work processes that satisfy electrical principles for safety and functionality.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where

License to practice

3)

applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, and power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE1 02A Fabricate, dismantle, assemble of utilities industry components

UEENEEE1 05A Fix and secure electrotechnology equipment

UEENEEE1 07A Use drawings, diagrams, schedules, standards, codes and specifications

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

- | | |
|--|--|
| 1 Prepare to lay wiring/cabling and connect accessories for extra-low voltage circuits. | 1.1 OHS procedures for a given work area are obtained and understood through established routines. |
| | 1.2 Established OHS risk control measures in preparation for the work are followed. |
| | 1.3 Safety hazards not previously identified are reported and advice on risk control measures is sought from the work supervisor. |
| | 1.4 The nature and location of the work is obtained from work supervisor or other appropriate person to establish the scope of work to be undertaken. |

ELEMENT

PERFORMANCE CRITERIA

- | | | |
|---|--|--|
| | 1.5 | Advice is sought from the work supervisor or other appropriate person to ensure the work is coordinated effectively with others. |
| | 1.6 | Sources of materials that may be required for the work are established in accordance with established routines. |
| | 1.7 | Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety. |
| 2 | Lay wiring/cabling and connect accessories for extra-low voltage circuits. | |
| | 2.1 | Established OHS risk control measures for carrying out the work are followed. |
| | 2.2 | Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures. |
| | 2.3 | Wiring and accessories are installed to comply standards and job specifications with sufficient excess to affect terminations. |
| | 2.4 | Accessories are installed straight and square in the required locations and within acceptable tolerances. |
| | 2.5 | Cables and conductors are terminated at accessories in accordance with manufacture's specifications and regulatory requirements. |
| | 2.6 | Cables installed for future service and marked in accordance with the cable identification scheme and terminated in compliance with regulatory requirements. |
| | 2.7 | Procedures for referring non-routine events to immediate supervisor for directions are followed. |
| | 2.8 | Cable installation and termination is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices. |

ELEMENT	PERFORMANCE CRITERIA
3 Complete and report work activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Work supervisor is notified of the completion of the installation work in accordance with established routines.

Required Skills and Knowledge

EQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and laying wiring/cablings and terminate accessories for extra-low voltage circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE108A

Extra low voltage wiring

Evidence shall show an understanding of extra low voltage wiring cable protection and support method and accessories to an extent indicated by the following aspects:

T1 Cable protection and support method and accessories encompassing:

- Requirements to protect and support cables adequately - protection against mechanical damage, protection from adverse temperatures and corrosion and protection from magnetic field that may affect the performance of the cable.
- Cable support and protection devices, accessories and typical applications - metallic and non-metallic conduits, duct and trunking, cable ladder and tray, cable clips and ties and related accessories.
- Installation techniques - cable installation equipment and cable drawing and hauling techniques

T2 Types of cables used in the electrotechnology industry and their application encompassing:

- Structural components of cables and their purpose - conductors and conductor material; insulation; sheathings and servings.
- Application of various cables types
- Cable variates - single cables, flexible cables, flexible cords, shielded cables, armoured cables, ribbon cables, other similar and like cables
- Typical characteristics and use of power circuit cables and control circuit cables

T3 Installing cables in buildings, structures and premises encompassing:

- Building construction method and construction sequence.
- Typical cable routes through buildings, structures and premises.
- Building codes affecting the installation of cables in buildings, structures and premises - limitation on penetration structural elements and maintenance of fire protection interiority
- Cable segregation requirements

T4 Basic cable and conductor terminations encompassing:

- Insulation removal and replacement
- Conductor handling and cable terminations encompassing:
 - General aspects and soldering involving pins on electronic components and

EQUIRED SKILLS AND KNOWLEDGE

stranded conductors carrying current up to 25 amperes.

- Application of connecting devices for conductors and terminals
- Continuity through connections and insulation resistance testing
- Stress release on cables/conductors.

T5 Technical standards, regulations and codes related to extra-low voltage work encompassing:

- Limitation imposed by regulations
- How to read and apply a standard
- Aspects of technical Standards that apply to extra-low voltage work

T6 Environmental and heritage regulation effecting electrotechnology work encompassing:

- Purpose of environmental and heritage regulation
- Typical issues affecting electrotechnology services and systems
- Meeting requirements

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside

the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement

- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Lay wiring/cabling and terminate accessories for extra-low voltage in power and control circuits as described in 8) and including:
 - A Understanding the nature of the work.
 - B Selecting appropriate tools, cables and accessories.
 - C Following appropriate cable routes.
 - D Installing cable and accessories to requirements.
 - E Terminating cables and accessories to manufacture's specifications and requirements.
 - F Cleaning worksite.
 - G Notifying completion of work using established procedures.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to laying wiring/cabling and terminate accessories for extra-low voltage circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE10 2A Fabricate, dismantle, assemble of utilities industry components

UEENEEE10 5A Fix and secure electrotechnology equipment

UEENEEE10 7A Use drawings, diagrams, schedules, standards, codes and specifications

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to laying wiring/cabling and connecting accessories for extra-low voltage power and control cabling systems circuits using:

- At least one of the following wiring/cabling systems:
 - Unenclosed thermoplastic sheathed (TPS) cable
 - Enclosed thermoplastic insulated (TPI) or sheathed cables, and
- At least three of the following wiring/cabling systems:
 - single cable,
 - flexible cable,
 - flexible cord,
 - shielded cable,
 - ribbon cable,
 - other similar and like cable

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Electrotechnology

UEENEEE124A Compile and produce an energy sector detailed report

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers complying and producing an energy sector report. It encompasses determining the safety requirements are met and all regulatory responsibilities are adhered to. The person competent in this unit must demonstrate an ability to identify information sources and collect and analyse and format information applicable to the electrotechnology industry and produce a report as required.

Application of the Unit

Application of the Unit 2)

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

There are no prerequisite competencies for this unit.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills
 The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to develop a energy sector report.	1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
	1.2 Established techniques for report writing are reviewed are adopted in accordance with

ELEMENT	PERFORMANCE CRITERIA
	organisation policies.
	1.3 The scope of the report is evaluated and report parameters established using a formal evaluation/survey processes.
	1.4 Criteria from other related works impacting on the report are determined from other sources.
	1.5 Identify source and availability of information.
2 Develop energy sector report.	<p>2.1 Report is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.</p> <p>2.2 Report is developed in collaboration with all relevant personnel.</p> <p>2.3 Competent persons are identified to assist in the compilation of the report.</p> <p>2.4 Report is reviewed against all inputs and adjusted to rectify any anomalies.</p> <p>2.5 Compile report in accordance with organisation policies and procedures.</p> <p>2.6 Compile and analyse research report information</p>
3 Obtain approval for final energy sector report.	<p>3.1 Report is presented and discussed with person(s) of higher authority.</p> <p>3.2 Alterations to the report resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.</p> <p>3.3 Final report is presented and approval obtained from appropriate person(s).</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and compiling and producing an electrotechnology report.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE124A

Energy sector detailed report writing

Evidence shall show an understanding of analysis, decision making and reporting as they apply to engineering work functions to an extent indicated by the following aspects:

T1 Communicating with personnel encompassing:

- Oral communications
- Written procedures and work instructions

T2 Communicating with suppliers

T3 Communicating with customers

T4 Purpose and extent of maintaining work activities records in an enterprise encompassing:

- Types of records for maintaining work activities in an enterprise
- Methods for recording and maintaining work records
- Work records required by regulation requirements
- Using basic computer functions encompassing:
 - Starting up
 - Selecting application
 - Entering information
 - Saving
 - Printing

T5 Techniques of analysis encompassing:

- use of appropriate sampling techniques to collect data.
- types of data and classification.
- effective questionnaire design
- data collection errors.
- frequency tables.
- statistical diagrams – drawing and interpretation.
- the general shape of a frequency distribution.
- different types of diagrams.
- mean time between failures calculations

REQUIRED SKILLS AND KNOWLEDGE

T6 Summary of statistics encompassing:

- measures of central tendency
- measures of dispersion
- a 5-point summary for a given data set, box and whisker plot distribution
- data sets comparison using measures of centre and spread
- the effect of outliers on measures of centre and spread
- use computer programs or calculators to simplify calculations

T7 Correlation and regression encompassing:

- bivariate data and scatter diagrams.
- product-moment correlation coefficient calculation and interpretation.
- difference between causation and correlation.
- equations of regression lines from bivariate data with a calculator and line plotting on a scatter diagram.
- using the equation of regression to make predictions in practical situations.
- investigation of practical problems using correlation and regression.

T8 Investigation and reporting encompassing:

- presentation of a well formatted report with a clearly stated aim.
- using the internet to obtain relevant data.
- description of the statistical method and design chosen to meet the aim of the investigation.
- statistical analysis and results reporting.
- evaluation and interpretation of the results of the investigation.
- discussion of the investigation with reference to real world applications.
- chronology of the investigation.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Compile and produce an energy sector report as described in 8) and including:

- A Typical organisation policies and procedures.
- B Access to a report brief to established report parameters.
- C Access to appropriate person(s) to establish report requirements.

- D Establishing the scope and parameters of the report.
- E Determining the impact of other related works.
- F Developing design brief incorporating scenarios and all requirements.
- G Appropriate computer application.
- H Identifying competencies required for the report.
- I Documenting report proposal.
- J Negotiating alterations to the proposed report successfully.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to compiling and producing an energy sector report.

**Method of
assessment****9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units****9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit of competency describes work conducted by technical personnel who contribute to the conduct of energy sector report writing.

This unit of competency is typically performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. This generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the research process.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter being reported upon. This unit of competency should be demonstrated in accordance with the organisations

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Standard Operating Procedures
- Resources
- Technical standards
- Regulatory requirements

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Electrotechnology

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers determining correct operation of complex multiple path circuits and providing engineering solutions as they apply to various branches of electrotechnology work functions. It encompasses working safely, problem solving procedures, including using electrical measuring devices, applying appropriate circuit theorems and providing solutions derived from measurements and calculations and justification for such solutions.

Application of the Unit

Application of the Unit 4)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE126 Provide solutions to basic engineering
A computational problems

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to solve problems in complex multiple path circuits.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct

ELEMENT	PERFORMANCE CRITERIA
	operation and safety.
2 Solve problems in complex multiple path circuits	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established methods are used to solve circuit problems from measure and calculated values as they apply to complex multiple path circuit.
	2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to solve circuit problems is documented.
	3.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and provide engineering solutions for solving problems in complex multiple path circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE125A

Circuit analysis

Evidence shall show an understanding of circuit analysis to an extent indicated by the following aspects:

T1 Voltage/Current Sources and Kirchhoff's Law for d.c. Linear Circuits encompassing:

- calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources
- calculating current and voltage in any d.c. network of up to two loops and three sources.
- Kirchhoff's Law using a circuit simulation program.
- function and operation of an electronics circuit simulation program.
- using electronics circuit simulation program.

T2 Superposition Principles for d.c. Linear Circuits encompassing:

- d.c. networks (two loops, three sources)
- using simulation programs
- calculating current and voltage in any d.c. network of up to two loops and three sources.
- Superposition theorem using a circuit simulation program.

T3 Mesh and Nodal Analysis for d.c. Linear Circuits encompassing:

- writing mesh equations for d.c. networks containing up to three loops.
- writing Nodal equations for d.c. networks containing up to three nodes.
- using mesh analysis to find currents in d.c. networks of up to two loops.
- using nodal analysis to find node voltage and branch currents in d.c. networks of up to two nodes
- using a circuit simulation program to confirm the results of Mesh analysis or Nodal analysis of d.c. networks.

T4 Thévenin's principles for d.c. Linear Circuits encompassing:

- calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources.
- calculating the Thévenin equivalent voltage and resistance for d.c. networks and determining the load current, voltage and power.

REQUIRED SKILLS AND KNOWLEDGE

- converting the Thévenin equivalent circuit to a Norton equivalent circuit and vice versa.
- verifying the equivalence of Thévenin equivalent circuits by measurement.

T5 Norton's principles for d.c. linear circuits encompassing:

- calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources.
- calculating the Norton equivalent current and resistance for d.c. networks and determining the load current, voltage and power.
- converting the Thévenin equivalent circuit to a Norton equivalent circuit and vice versa.
- verifying the equivalence of Norton equivalent circuits by measurement.

T6 Phasors encompassing:

- time domain and frequency domain
- frequency, angular frequency and units of measurement
- defining rms and convert between time domain and rms phasor values for a sine wave.
- converting between angular frequency and frequency.
- using a calculator to convert between polar and rectangular forms of phasor.
- representing a.c. voltages on a phasor diagram.

T7 Complex Impedance encompassing:

- defining impedance, resistance and reactance.
- defining admittance, conductance and susceptance.
- converting between conductance to resistance.
- converting between susceptance and reactance.
- converting between impedance and admittance.
- sketching impedance and admittance diagrams.
- calculating two-component series equivalent circuits and two-component parallel equivalent circuits and convert between these forms.

T8 Series and parallel a.c. linear circuits encompassing:

- Kirchoff's Laws
- series equivalent impedance
- parallel equivalent impedance
- voltage divider and current divider rules
- calculating and measuring voltage and currents in a series a.c. circuit and draw the phasor diagram.
- calculating and measuring currents in a parallel a.c. circuit and draw the phasor diagram.
- calculating and measuring voltage and currents in a series/parallel a.c. circuit and draw the phasor diagram.

T9 Superposition principles and Kirchoff's Laws applied to a.c. linear circuits encompassing:

- calculating current and voltage in any a.c. network of up to two loops and two sources.
- using circuit simulation programs to demonstrate the superposition theorem.

REQUIRED SKILLS AND KNOWLEDGE

- function and operation of an electronics circuit simulation program.
- entering given circuit specifications into an electronic circuit program.
- setting the circuit simulation program operation parameters including input and output values, ranges and graduation.
- producing hardcopies of the circuit and analyse results.

T10 Mesh and Nodal analysis for a.c. linear circuits encompassing:

- Mesh analysis
- Node voltages and nodal analysis
- matrix representation
- method of determinants
- writing mesh equations for a.c. networks containing up to three loops.
- writing nodal equations for a.c. networks containing up to three nodes.
- using mesh analysis to find currents in a.c. networks of up to two loops.
- using nodal analysis to find node voltage and branch currents in a.c. networks of up to two nodes.
- using a circuit simulation program to confirm the results of mesh analysis or nodal analysis of a.c. networks.

T11 Thévenin and Norton theorems applied to a.c. linear circuits encompassing:

- calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources.
- calculating the Thévenin equivalent voltage and impedance for a.c. networks and determining the load current, voltage and power.
- calculating the Norton equivalent current and impedance for a.c. networks and determining the load current, voltage and power.
- converting the Thévenin equivalent circuit to a Norton equivalent circuit and vice versa.
- verifying the equivalence of Thévenin and Norton equivalent circuits by measurement.

T12 Star-delta conversions encompassing:

- Star connections
- Star-delta transformation formula equations
- selection of appropriate conversion
- calculating the delta connected equivalent of a star connected balanced a.c. or d.c. load and vice versa.
- converting a complex non-series/parallel network to a series/parallel network by means of star-delta or delta-star conversions.
- verifying star-delta and delta-star network conversions by measurements.

T13 Complex a.c. power and maximum power transfer theorem encompassing:

- true power, reactive power and apparent power
- maximum power transfer
- calculating real, reactive and apparent power for series/parallel a.c. circuits and state the

REQUIRED SKILLS AND KNOWLEDGE

appropriate units of measurement.

- calculating the power factor of a.c. series/parallel circuits.
- drawing power triangle for a given circuit.
- calculating the load value which would consume maximum power and calculate this power for d.c. networks.
- calculating the load value which would consume maximum power in an a.c. network when the load is a pure resistance and calculate the power.
- calculating the load value which would consume maximum power in an a.c. network when the load is an impedance of variable resistance and reactance and calculate the power.
- verifying load selection by measurement.

T14 Transients encompassing:

- transients in R-C and R-L circuits
- growth and decay
- calculating voltage and currents in R-C series circuits using exponential equations.
- calculating voltage and currents in R-L series circuits using exponential equations

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and

EVIDENCE GUIDE

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Solve problems in complex multiple path circuits as described in 8) and including:
 - A Determining the operating parameters of existing circuit.
 - B Using established problem solving methods.
 - C Taking relevant measurements accurately.
 - D Interpreting measured values appropriately.
 - E Providing effective solutions to circuit problems from measurements and calculations.
 - F Giving written justification of solutions provided.
 - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in complex multiple path circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Complex series-parallel circuits as they apply to problems related to engineering diagnosis and development work functions in any of the following disciplines:
 - Computers
 - Data Communications
 - Electrical
 - Electronics
 - Instrumentation
 - Refrigeration and Air Conditioning
- In relation to the following types of circuit problems and on at least two occasions:
 - Determining the operating parameters of an existing circuit
 - Altering an existing circuit to comply with specified operating parameters
 - Developing circuits to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Custom Content Section

Competency Field 5)

Electrotechnology

UEENEEE126A Provide solutions to basic engineering computational problems

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the application of computational processes to solve engineering problems. It encompasses working safely, applying problem solving techniques, using a range of mathematical processes, providing solutions to electrical/electronics engineering problems and justifying such solutions.

Note.

Typical engineering problems are those encountered in meeting requirements in a design brief, meeting performance requirements and compliance standards, revising systems operating parameters and dealing with system malfunctions

Application of the Unit

Application of the Unit 4)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE029B Solve electrotechnical problems

or

UEENEEG102A Solve problems in low voltage a.c. circuits

or

UEENEEH014B Troubleshoot frequency dependent circuits

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Provide computational solutions to engineering problems.	1.1 OHS procedures for a given work area are obtained and understood
	1.2 The nature of the problems are obtained from documentation or from work supervisor to establish the scope of work to be undertaken
	1.3 Problems are clearly stated in writing and/or diagrammatic form to ensure they are understood and appropriate methods used to resolve them.
	1.4 Known constants and variable related to the problem are obtained from measured values or problem documentation.
	1.5 Alternative methods for resolving the problem are considered and where necessary discussed with appropriate person(s).

ELEMENT**PERFORMANCE CRITERIA**

	1.6	Problems are solved using appropriate mathematical processes and within the realistic accuracy.
2 Complete work and document problem solving activities	2.1	Justification for solutions used to solve engineering problems is documented for inclusion in work/project development records in accordance with professional standards.
	2.2	Work completion is documented and appropriate person(s) notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing computational solutions to basic engineering problems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE126A

Electrotechnology engineering maths

Evidence shall show an understanding of electrotechnology engineering maths to an extent indicated by the following aspects:

T1 Rational, irrational numbers and basic algebra

- simplification of expressions involving square roots and cube roots
- scientific and engineering notation
- evaluation of expressions using a calculator
- convert units of physical quantities using unity brackets
- substitute given values into formulae to find physical quantities
- manipulate algebraic expressions using mathematical operations in their correct order, the laws of indices, expansion of brackets and collecting like terms

T2 Algebraic manipulation

- Factorise algebraic expressions using common factors
- Factorise quadratic expressions using trial and error on the factors of the coefficients
- Simplify algebraic fractions using common denominators and cancelling
- Solve simple one variable equations including algebraic fractions
- Find the quotient and remainder given a linear divisor.
- Transpose formulae to find a required variable.

T3 Laws of indices

- Conversion between decimal notation, scientific notation and engineering notation
- Laws of indices: positive /negative values, multiplication/division, fractional values, index equals zero
- Logarithmic laws: multiply/divide
- solution of exponential equations using logarithms, substitution and solution of relevant formulae involving exponents or logarithms
- Graphs of exponential functions, 10^x and e^x and the inverses $\log_{10}(x)$ and $\log_e(x)$ functions on log-linear graphs
- Convert numbers into scientific and engineering notation using the laws of indices
- Manipulate and simplify arithmetic and algebraic expressions using the laws of indices

REQUIRED SKILLS AND KNOWLEDGE

and logarithms

- Express logarithms as indices.
- Perform logarithmic operations.
- Determine logarithms and antilogarithms to base 10, using a scientific calculator.
- Determine logarithms and antilogarithms to base e, using a scientific calculator.
- Convert logarithmic values from base 10 to base e and vice versa.
- Sketch given functions on log-linear graphs

T4 Estimations, errors and approximations

- Errors in measurement
- Maximum probable error
- Show awareness of errors in measurement and of giving results in appropriate number of significant figures
- Use estimations and approximations to check the reasonableness of results.

T5 Plane figures – triangles and basic trigonometry

- Angles in a triangle
- Isosceles and equilateral triangles
- Congruent triangles
- Similar triangles
- Pythagoras' theorem
- Area of triangles
- Basic trigonometry functions
- Degrees, radians
- The ratios: sin, cos, tan, cosec, sec, cot.
- Inverse trig functions
- Sine and cosine rules

T6 Plane figures - quadrilaterals and circles

- Types and properties of quadrilaterals
- Areas and perimeters of regular quadrilaterals
- Lengths of arcs
- Angles in a circle - degrees
- Angles in a circle - radians
- Lengths of chord segments
- Tangents to circles
- Circumference and area of circles
- Names and characteristics of common polygons

T7 Graphs of Trigonometric functions

- Graph trigonometric functions and solve trigonometric equations.
- Simplify trigonometric expressions using trigonometric identities

REQUIRED SKILLS AND KNOWLEDGE

- Convert angular measure in degrees to radians and vice versa
- Graph trigonometric functions including graphs of $y = \sin x$ and $y = \cos x$
- Using vocational applications of current or voltage as a function of time, consider changes in amplitude, consider changes in frequency.
- Examine relationships of frequency, period and angular velocity.
- Sketch graphs of the form $f(t) = a \sin \phi t$ and $f(t) = a \cos \phi t$, where a is the peak voltage or current, and ϕ is the angular velocity
- Solve graphically equations of the form $f(t) = a \sin \phi t$ and $f(t) = a \cos \phi t$
- Show a positive or negative angle on the unit circle.
- Use symmetry properties to find trigonometric ratios for angles greater than $\pi/2$.
- Solve simple vocational problems relating period, frequency and angular velocity.

T8 Graphs of linear functions

- The number plane
- Gradient and x and y intercepts of a straight line
- Equation of a straight line length and mid-point of a straight line segment
- Function notation

T9 Simultaneous equations

- Graphical solutions
- Substitution
- Elimination
- Solve 2 linear simultaneous equations both algebraically and graphically.

T10 Matrices

- Perform the basic operations on matrices up to 3×3
- Manipulate matrix equations and expressions
- Recognise inverse and identity matrices up to 3×3 and use to solve systems of linear equations.
- Find determinants up to 3×3 and use to solve systems of linear equations.
- Solve problems involving more than two simultaneous equations.
- State the limitations of graphical methods of solution.
- Distinguish between a matrix and an array.
- Describe the null, diagonal and unit matrix
- Describe and identify a singular/non-singular matrix

T11 Quadratic functions

- Graphs of quadratic functions represented by parabolas and the significance of the leading coefficient.
- Graph quadratic functions and solve quadratic equations.
- Sketch and interpret the graphs of quadratic functions showing the significance of the leading coefficient and the zeros
- Solve quadratic equations by factoring or using quadratic formula

REQUIRED SKILLS AND KNOWLEDGE

- Solve simultaneously linear and quadratic equations algebraically and geometrically
- Interpret verbally formulated problems involving quadratic and linear equations and solve.

T12 Exponential and logarithmic functions

- Transform non-linear functions (including exponential) to linear forms and plot data.
- Draw curves of best fit, interpolate data and estimate constants in suggested relationships.
- Interpret verbally formulated problems involving growth and decay, and solve.
- Graph exponential and logarithmic functions and solve exponential and logarithmic equations.
- Sketch the graphs of simple exponential and logarithmic functions showing behaviour for large and small values

T13 Vectors and Phasors

- The vector as an expression of magnitude and direction
- The vector sum of x and y values in terms of magnitude and direction
- Rectangular components of vectors in the form $x = r \cos \theta$ and $y = r \sin \theta$
- Rectangular-polar and polar-rectangular conversion
- Vector addition and subtraction
- Express rectangular components of vectors in the form $x = r \cos \theta$ and $y = r \sin \theta$

T14 Complex numbers

- Definitions and notation of complex numbers
- Complex numbers as vectors on an Argand diagram
- laws of complex numbers and apply the laws in suitable calculations.
- Plot complex numbers on the Argand plane.
- Express vectors as complex numbers and perform suitable calculations.
- Calculate the conjugate of a complex number.
- Using a calculator for rectangular-polar and polar-rectangular conversions.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

EVIDENCE GUIDE

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Provide computational solutions to basic engineering problems as described in 8) and including:
 - A Clearly stating problems in written and diagrammatic form.
 - B Obtaining known constants and variable from an appropriate source.
 - C Solving problems using appropriate mathematical processes.
 - D Documenting justification of solutions provided in accordance with professional standards.
 - E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to providing computational solutions to basic engineering problems.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to problems that apply to engineering diagnosis development and work functions with the following attributes:

- working safety
- problem solving techniques application
- range of mathematical processes used
- provision electrical/electronics engineering problems solutions
- such solutions justification

Providing computational solutions to basic engineering problems shall be demonstrated in any of the following disciplines:

- Computers
- Data Communications
- Electrical
- Electronics
- Instrumentation
- Refrigeration and Air Conditioning

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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2.2) Literacy and numeracy skills

Competency Field 5)

Electrotechnology

UEENEEE131A Solve problems in ELV circuits for non electrical workers

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers basic electrical fundamentals to support non electrical workers in jobs that incorporate some exposure to extra low voltage electricity. It encompasses working safely, recognising basic electrical components and the use of basic voltage, current and resistance measuring devices.

Application of the Unit

Application of the Unit 2)

2.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

2.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Licensing/Regulatory Information

License to practice 3)

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable

License to practice**3)**

contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 2 Writing 2 Numeracy 2

Employability Skills Information**Employability Skills****5)**

The required outcomes described in this unit of competency contain applicable facets of Employability

Employability Skills

5)

Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1 Prepare to work on simple extra-low voltage electrical circuits.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	OHS risk control work preparation measures and procedures are followed.
	1.3	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.4	Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.
	1.5	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Perform basic maintenance and inspection of simple extra low voltage electrical circuits.	2.1	OHS risk control work measures and procedures are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits are checked as being isolated where

ELEMENT	PERFORMANCE CRITERIA
	necessary in strict accordance OHS requirements and procedures.
	2.4 Basic maintenance and inspection procedures are followed.
3 Complete work and report maintenance and inspection activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Work completion is documented and appropriate person(s) notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in extra-low voltage single path circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE131A ELV Electrical Fundamentals

Evidence shall show an understanding of electrical fundamentals for non electrical workers to an extent indicated by the following aspects:

T1 Basic electrical concepts encompassing:

- electrical current
- production of electricity by simple renewable and non renewable energy sources
- utilisation of electricity by various loads

T2 Basic electrical circuit encompassing:

- symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in a circuit diagram
- purpose of each component in the circuit
- voltage and current levels in a simple circuit
- relationship between voltage drops and resistance
- setting up and connecting a simple circuit measurement of resistance, voltage and current values in a simple circuit effects of an open-circuit, a closed-circuit and a short-circuit

T3 Electrical power encompassing:

- concepts of power and energy
- effects of power rating of components

T4 Effects of electrical current encompassing:

- physiological effects of current and the fundamental principles (listed in AS/NZS 3000) for protection against the this effect
- typical uses of the effects of current
- fundamental principles (listed in AS/NZS3000) for protection against the damaging effects of current

T5 Electrical energy sources encompassing:

- principles of producing an electric current from motor generator sets
- principles of producing an electrical current from photo-voltaic arrays
- principles of producing an electrical current from primary, and secondary cells

T6 Resistance encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- power loss (heat) occurring in a conductor.
- effect of losses in electrical wiring and machines
- measurement of resistance

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing

on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Performing basic maintenance on simple extra-low voltage

circuits as described in 8) and including:

- A Following basic maintenance procedures
- B Reporting information arising from basic maintenance and inspection.
- C Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to in extra-low voltage single path circuits.

Method of assessment 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended

for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

- This unit shall be demonstrated in relation to simple circuits as they apply to maintenance work functions in any of the following disciplines:
 - Renewable and sustainable energy systems, and
 - Remote area essential service operations
- In relation to the following on at least two occasions:
 - Identifying the components of an existing circuit
 - making and reporting measurements of circuit parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers identifying occupational health and safety hazard and risks and documenting control measures. It encompasses identifying workplace hazards, assigning levels of risk, developing control measures to eliminate and/or mitigate risks, reviewing risk control measures and maintaining documentation of hazards, risk control measures and their application in accordance with compliance procedures.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE10 Apply Occupational Health and Safety
1A regulations, codes and practices in the
workplace

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this competency standard unit contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this competency standard unit is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

This unit addresses information, processes and techniques for the application of occupational health and safety specific to working with electrotechnology and is essential for employees without managerial or supervisory responsibilities

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Identify and document hazards and risks.	1.1 Hazards are identified the appropriate persons involved and in accordance with compliance procedures.
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Note:

Typically this will relate to such things as:
The type of job, Electrical conditions, Energy levels, Radiation levels, Toxic substances, Airborne particles, Pressure discharge, Explosive atmosphere, Work-site location, General work-site conditions, Specific work location, Moving parts, Tools and equipment, Workers

ELEMENT	PERFORMANCE CRITERIA
	competence and/or capacity and/or personal effects
	1.2 Risks associated with identified hazards are determined in consultation with others and documented in accordance with compliance procedures.
	1.3 Provision is made to accommodate changes to documentation should unforeseen hazards be identified.
2 Assign levels of risk and develop and document control measures.	2.1 Level of risk is assigned for each identified hazard in accordance with the regulations and following compliance procedures.
	2.2 Control measures are developed for hazard, level of risk and activity to eliminate and/or mitigate the risk following compliance procedures.
	2.3 Hazard, level of risk and control measures are agreed to and documented in consultation with all involved in accordance with compliance procedures.
3 Monitor and review the control measures.	3.1 Documented control measures are made available for reference by all involved with the work.
	3.2 Control measures are modified where required in consultation with all involved with the work in accordance with compliance procedures.
	3.3 Documentation of hazards, risk control measures and their application are filed in accordance with compliance procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and documenting occupational hazards and risks in electrical.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE137A Risks and control measures for dealing with workplace hazards

Evidence shall show an understanding of risks and control measures for dealing with workplace hazards to an extent indicated by the following aspects:

T1 Risk management and assessment of risk encompassing:

- Principle and purpose of risk management, and
- Processes for conducting a risk assessment
- Hazard identification by job analysis and work-site inspections
- Recording hazards and assessing the risk.

T2 Hazards and risks and control measures in working on construction sites encompassing:

- Hazards include manual and mechanical handling; working at heights; working in confined spaces; noise; dusts, gases, chemicals.

T3 Hazards associated with extra-low voltage, low-voltage and high-currents encompassing:

- Arrangement of power distribution and circuits in electrical installations
- Parts of an electrical system and equipment that operate at low-voltage and extra-low voltage,
- Parts of an electrical system and equipment where high-currents are likely.

T4 Hazards and risks and control measures associated with high-voltage encompassing:

- Parts of an electrical system and equipment that operate at high-voltage,
- The terms 'touch voltage', 'step voltage', 'induced voltage' and 'creepage' as they relate to the hazards of high-voltage
- Control measures used for dealing with the hazards of high-voltage.

T5 Hazards and risks and control measures in working with low voltage equipment encompassing:

- Risks in modifying electrical installations, fault finding, maintenance and repair.

REQUIRED SKILLS AND KNOWLEDGE

- Control measures before, while and after working on electrical installations, circuits or equipment.
- Isolation and tagging-off procedures.
- Risks and restrictions in working live.
- Control measures for working live.

T6 Hazards and risks and control measures associated with harmful, devices, materials, gases, dusts and airborne contaminant encompassing:

- Harmful devices: gas touches, welding equipment, laser equipped devices and the like.
- Harmful materials: gases (refrigerants) and some industrial cleaning agents, fibres of optical cable, thermal insulation
- Harmful airborne contaminants: fibres of thermal insulation, fibres of optical cable, fibrous cement materials, asbestos and other fibres in insulation materials.

T7 Determine the degree of the risk encompassing:

- The three recognised levels of risk are:
 - High (potential to kill or permanent disability);
 - Medium (potential to cause an injury or illness of a permanent nature);
 - Low (potential to cause a cause minor injury requiring first aid but no permanent disability)

T8 Use control measures to eliminate or control the risk encompassing:

- Hierarchy of control measures are:
 - eliminate the risk by discontinuing the activity.
 - control the risk by redesigning the equipment
 - adopt administrative procedures
 - use of personal protective equipment.
- Control measures are formally documented in Job Safety Analysis (JSAs) or Safe Work Methods (SWMs).

T9 Engaging in monitoring and reviewing processes to ensure control measures remain valid.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

EVIDENCE GUIDE

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also

EVIDENCE GUIDE

comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Document and applying measure to control occupational health and safety risks in electrotechnology work as described in 8) and including:
 - A Identifying with appropriate person and in accordance with compliance procedures.
 - B Determining the risk associated with identified hazards
 - C Assigning the risks and developing and documenting control measures.
 - D Reviewing and modifying control measures where required.
 - E Recording activities.
 - F Dealing with unplanned events

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to documenting occupational hazards and risks in electrical.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with other related units making up a qualification or possible skill clusters.

Components of this unit are also included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to electrotechnology work functions, including but limited to: installation, testing, inspection, fault finding, maintenance or development work functions covering:

- Relevant occupational health and safety legislation, regulations and codes of practice related to devices and systems and hazards present in residential, commercial and industrial workplaces.
- Accepted industry work procedures and the specific safety procedures and work instructions for a particular workplace or organisation.

In any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation and Control
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology
- Energy Supply, Transmission and Distribution Networks

RANGE STATEMENT

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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Custom Content Section

Competency Field	5)
	Electrotechnology

UEENEEE151A Transport apparatus, equipment and materials

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers transport apparatus, plant accessories and materials. It encompasses safe working practices and following work processes that satisfy electrical principles for transporting apparatus and materials.

Application of the Unit

Application of the Unit 2)

This unit shall apply to persons entering work in energy sector and may be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, and power operated tools, vehicles, road signage and traffic control,

License to practice**3)**

lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

There are no prerequisite competencies for this unit.

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills****5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan and prepare for the transport of apparatus and materials.	1.1 Transport of apparatus and materials is planned and prepared to ensure OHS policies and procedures are followed, the work is appropriately sequenced in accordance with requirements.
	1.2 Appropriate personnel are consulted to ensure apparatus; accessories, plant, equipment and/or materials are appropriately identified, and checked against manufacturer transport instructions and requirements.
	1.3 Transport details of apparatus and materials are checked against job requirements.
	1.4 Plant needed to carry out the work is obtained in accordance with established procedures and checked for correct operation and safety.
	1.5 Where appropriate, team and individual work roles and responsibilities within the team are identified.
	1.6 Preparatory work is checked to ensure no damage has occurred and complies with requirements.
2 Transport apparatus and materials.	2.1 OHS policies and procedures for the transport of apparatus plant and materials are followed.
	2.2 Apparatus, plant and materials are transported in accordance with requirements, and manufacturer transport instructions without damage or distortion to the surrounding environment or services.

ELEMENT	PERFORMANCE CRITERIA
	2.3 Unplanned events or conditions are responded to in accordance with established procedure.
	2.4 Approval is obtained in accordance with established procedures from appropriate personnel before any contingencies are implemented.
	2.5 Ongoing checks of the work quality are undertaken in accordance with established procedures.
3 Check and notify completion of work.	3.1 Final inspections are undertaken to ensure the transported apparatus and materials conforms to requirements.
	3.2 Work completion is notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and transporting energy sector apparatus and materials.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE151A Energy sector apparatus and materials transport

Evidence shall show an understanding of energy sector apparatus and materials transport to an extent indicated by the following aspects:

T1 Energy sector apparatus encompassing:

- Types of apparatus used in the electrotechnology, ESI and gas industry

T2 Energy sector materials encompassing:

- Types of materials used in the electrotechnology, ESI and gas industry
- OH&S requirement

T3 Energy sector transport encompassing:

- Types of transport used in the electrotechnology, ESI and gas industry
- Manual handling techniques

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best

utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline,

work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Transport apparatus and materials as described in 8) and including:

- A Transporting apparatus.
- B Transporting equipment.
- C Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to transporting apparatus and materials.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to transporting apparatus and equipment in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

UEENEEE190A Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers the preparation of, and modification of, preliminary engineering drawings for electrotechnology/utilities applications using manual drafting methods and computer-aided design (CAD) equipment and software from specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEED1 04A Use software for engineering applications

UEENEEE1 02A Fabricate, dismantle, assemble of utilities industry components

UEENEEE1 07A Use drawings, diagrams, schedules, standards, codes and specifications

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to produce electrotechnology/utilities engineering drawings	1.1	OHS procedures for a given work area are identified, obtained and understood
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed
	1.3	The extent of the work is determined from project specifications and discussion with appropriate personnel
	1.4	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
	1.5	Software tools and equipment a needed for the work are obtained in accordance with established procedures
2 Produce electrotechnology/utilities engineering drawings	2.1	OHS risk control measures and procedures for carrying out the work are followed
	2.2	The types of design drawings and layouts required are determined from project specifications
	2.3	Technical data of system components is interpreted to determine parameters that are to be included in the drawings
	2.4	Appropriate software tools are used to produce drawing based on standard protocols
	2.5	Drawings are checked for accuracy are compliance with project specifications
	2.6	Methods for dealing with unexpected situations are selected on the basis of safety and specified work

ELEMENT

PERFORMANCE CRITERIA

outcomes.

- | | | | |
|---|--|-----|---|
| 3 | Complete and report electrotechnology/utilities engineering drawings | 3.1 | Completed drawings are submitted to an appropriate person to be checking for accuracy and compliance with project specifications. |
| | | 3.2 | Any alterations, additions or correction instructions are followed and drawings are re-submitted for final approval |
| | | 3.3 | Copies of completed drawings are filed securely in accordance with established procedures |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and methods used to prepare electrotechnology/utilities engineering drawings using manual drafting and CAD applications.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE190A Electrotech/utilities engineering drawings and diagrams

Evidence shall show an understanding of electrotech/utilities engineering drawings and diagrams to an extent indicated by the following aspects

T1 Drawing fundamentals encompassing:

- principles, purpose and classification of drawings
- basic drawing terms and conventions
- symbols, codes and abbreviations used in drafting drawings
- tools and equipment used in drafting drawings
- drawing forms; sheet size and format, metric, imperial, copy fold information
- drawing routines; signatures, approvals, dates, numbers and numbering systems, design considerations/specifications, materials or component specifications, lists, titles, proprietary information, fasteners, representations, notes, charts and graphs, modifications and revision conventions
- fundamentals of drafting documentation including contents, version control, indexing and product identification (e.g. logo, trademark, software warning plates)
- delineation; line conventions and lettering, multi- and sectional view drawings, pictorial drawings, types and application of engineering drawings, conventional representations, microfilming, descriptive geometry and revolutions
- measurements; types, forms, units, symbols, reading and transfer
- sketching techniques (e.g. freehand lettering)
- basic drafting skills (e.g. drafting by hand, working with triangles, and working with a T square)
- basic drawing layout (e.g. borders and information blocks)
- line types and weights
- geometric construction principles
- use of drawing instruments and equipment to produce basic technical drawings
- drawings instruments and media usage
- usage of reproducible drawings with mechanical pencils

T2 Lettering encompassing:

- principles, concepts and applications of lettering

REQUIRED SKILLS AND KNOWLEDGE

- terms, conventions and codes related to lettering
- construction of vertical or inclined, single-stroke Gothic lettering, numerals, and fractions, including proper spacing and guidelines
- proper lettering instruments selection
- usage of lettering techniques for notes and titles on drawings
- text style, text composition, and text placement selection and application

T3 Sketching encompassing:

- principals, practices and rules for sketching in relation to proportion, placement of the views, and drawing medium
- concepts and applications of sketching
- terms, conventions and codes related to sketching
- sketches used in industry
- usage of sketching aids for creative communication
- sketching types and their applications
- line techniques in sketching simple objects
- estimation and proportion techniques usage
- views selection for requisite applications
- blocking technique for size, shape, and details
- surface shading techniques

T4 Geometric construction encompassing:

- principles, concepts and applications of geometric construction
- terms, conventions and shapes related to geometric construction
- drawing techniques of lines, angles, circles, arcs, tangents, and polygons
- geometric construction to single-view and multi-view drawings
- graphic geometric controls
- intermediate CAD commands
- plotting and printing equipment set up and configuration

T5 Multi-view orthographic projections Australian/New Zealand and industry standards encompassing:

- principals of multi-view orthographic projections
- terms, conventions and codes related to multi-view drawings
- applications and use of orthographic projections/drawings (e.g. 3rd angle)
- types and usage techniques of orthographic projection
- sketching techniques related to orthographic views
- rules for orthographic projection
- working drawing problems and specifications
- views visualisation and selection
- 1st and 3rd angle projection drawings
- lines, lettering, and drawing medium types

REQUIRED SKILLS AND KNOWLEDGE

- fractional, decimal, and metric equations solutions
- concepts of units of measurement usage related to multi-view orthographic projections
- sectional and/or auxiliary views uses, identification and analysis
- rules for sections and auxiliary views
- geometric figures visualisation and drawing in two dimensions
- geometric figures classification and comparison
- circle properties and relationships, and circle problem solving
- drawing from a view of a model (e.g. orthographic projection)

T6 Auxiliary views encompassing:

- principles, terms and conventions usage in auxiliary views
- use and application of auxiliary views
- primary auxiliary view construction
- secondary auxiliary view construction

T7 Descriptive geometry/revolutions encompassing:

- principles, terms and conventions usage in descriptive geometry/revolutions
- graphic solutions of points, lines, and planes
- graphic solutions of intersections (e.g. lines, planes, and solids)
- true length of lines, bearing, and slope of lines
- graphic solutions of solids
- drawings construction using the revolution method

T8 Sectional views/conventions encompassing:

- principles, terms, symbols and conventions of sectional views
- use and application of sectional views
- drawing standard sectional views
- use of conventional breaks
- symbols used to represent different materials
- use of cutting plans

T9 Pictorial drawings introduction and production to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of pictorial drawings
- terms, symbols, conventions and codes usage in pictorial drawings
- types and usage techniques of pictorial drawings
- line of sight application
- isometric view usage
- pictorial drawing types usage and selection
- pictorial drawings sketching
- pictorial working drawing problems and specifications
- axonometric, oblique, and perspective drawings construction

REQUIRED SKILLS AND KNOWLEDGE

- calculations in projection plane angles
- standards for drawing pictorial drawings
- application of properties and relationships of triangles to solve geometric shapes
- conversion of an angular dimension of an orthographic to a linear dimension in a pictorial drawing
- drawing techniques of pictorial representations

T10 Dimensioning/size description and tolerancing as applied to drafting encompassing:

- principles, terms, symbols and conventions used in dimensioning and tolerancing
- terms, conventions and codes related to dimensioning
- dimensioning drawing construction using Australian/New Zealand standards
- types and usage techniques of dimensioning
- application of dimensioning to object drawings
- geometric dimensioning and tolerancing
- lines used in dimension drawings construction
- dimensioning practices applications
- dual dimensioning
- tolerancing applications
- dimensioning verification requirements
- formulas for positional tolerancing
- form, orientation, profile and runout

T11 Development layouts of various shaped objects to Australian/New Zealand and industry standards encompassing:

- principals and concepts of development layouts of various shaped objects
- terms, conventions and codes related to surface developments
- surface developments uses in Australian/New Zealand and industry standards
- basic three dimensional geometric shapes visualisation in a two dimensional plane
- cut out and construct models for checking accuracy
- rules to surface developments to produce stretchouts

T12 Layout drawings production to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of layout drawings
- terms, conventions and codes related to layout drawings
- layout drawings types and differences
- rules for layout drawings
- concepts of units of measurement usage related to layout drawings

REQUIRED SKILLS AND KNOWLEDGE

T13 Technical illustrations drawing to Australian/New Zealand and industry standards encompassing:

- principals, concepts and purpose of technical illustrations
- terms, conventions, symbols and codes related to technical illustrations
- types and usage techniques of illustrations
- rules for technical illustration application
- techniques and applications for creating illustrations
- illustration types usage and selection
- illustration working drawing problems and specifications
- techniques and applications in the use of drawing instruments to prepare illustrations
- surface shading purpose and types, selection and analysis
- techniques and applications in airbrush renderings to detailed illustrations
- techniques and applications of CAD practices to technical illustrations
- techniques and applications of line-shaded illustrations
- concepts of units of measurement usage related to illustrations
- solutions for illustrations using fractional, metric, and decimal equations

T14 Graphs and charts production to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of basic graphs, charts and diagrams production
- terms, conventions and codes related to basic graphs, charts and diagrams production
- graphs, charts and diagrams production types, usage and variations
- data configuration for graphic representation
- graph type selection per specifications and data
- basic graphic charts and diagrams interpretation
- charts and diagrams construction

T15 Thread representations encompassing:

- principles, concepts and applications of threaded fasteners
- terms, conventions and codes related to threaded fasteners
- types and usage techniques of threaded fasteners
- drawing of threads using simplified and schematic types of thread representation

T16 Working drawings encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- principles, concepts and applications of working drawings
- terms, conventions and codes related to working drawings
- types and usage techniques of working drawings
- title block, bill of materials, and schedules used in working drawings
- working drawing production requirements

T17 Care and use of equipment encompassing:

- principles, concepts and applications of various drafting instruments, equipment, and materials
- types and usage techniques of drafting instruments, equipment, and materials
- drawing materials selection for specific types of drafting projects
- drawing instruments usage as a means of technical drawings preparation for accuracy, and readability
- Computer Aided Design (CAD) station components identification
- CAD setup requirements to complete a basic drafting problem

T18 Computer-aided drawing design (CAD) - basics encompassing:

- principles, terms, symbols and conventions usage in computer-aided drawing design (CAD)
- concepts and applications of CAD and related application commands
- types of CAD hardware
- CAD standards encompassing: file presentation; layering standards - sorting graphic data including data groups, principal data, supporting data, layering naming convention, colour assignment standard (layer colours and pen weights), provision for creation of new layers; blocks standards - real blocks object, common block objects, symbol objects, block library, block naming; text style standards - text styles naming, text height; dimension styles standards - dimension style naming; linetype standards; title blocks and graphic scales - title block set-up, information title blocks, drawing scales; systems of measurement and preferred scales - drawing scales
- DOS and Windows application definitions
- techniques and practices in the application of program assist and editing commands
- view and display commands (e.g. zooming and panning)
- query commands to extract drawing data
- techniques and practices in the application of changes to text styles text entering and editing
- existing drawing modifications
- working with multiple drawings using cut and paste, etc.
- components and symbol libraries creation, editing and retrieval
- plotting drawings to the proper scale

REQUIRED SKILLS AND KNOWLEDGE

- scaling techniques applications
- layering techniques applications
- Line-Type (LT) scale usage
- drawing techniques application
- drawing setups to applicable standards (e.g. settings, layers, line types, and widths)
- 2-D drawing creation
- Cartesian, polar, absolute, and relative coordinates usage in drawing lines and shapes
- techniques and practices in the application of geometric construction
- techniques and practices in the application of text to a drawing
- techniques and practices in altering font options
- techniques and practices in the application of laying out, drawing, and completing orthographic drawings
- techniques and practices in the application of drawing objects in isometric using isometric drawing commands
- techniques and practices in the application of completing primary auxiliary drawings on the CAD equipment
- techniques and practices in the application of CAD to draw screw threads
- techniques and practices in the application of making, setting, and using layers and blocks

T19 Basic production fabrication drawings to Australian/New Zealand and industry standards encompassing:

- principles, terms, symbols, codes and conventions usage in production fabrication drawings
- types and usage techniques of detailed and assembly drawings
- detailing: encompassing principals, concepts and applications of detailing; terms, conventions and codes related to detailing; detailing types, application and selection; different fabrication processes and identification of machine parts; rules for drawing machine part details; concepts of units of measurement usage related to detailing; application of properties and relationships of triangles and circles to solve geometric shapes related to detailing
- assembly drawings: encompassing principals, concepts and applications of assembly drawings; terms, conventions and codes related to assembly drawings; different assembly processes and identification of machine part assemblies; rules for drawing assembly drawings; concepts of units of measurement usage related to assembly drawings; application of properties and relationships of triangles and circles to solve geometric shapes related to assembly drawings
- machine assembly drawing production
- detail drawings standard machine fits applications
- drawings for welded component parts
- parts list (e.g. balloons) development

REQUIRED SKILLS AND KNOWLEDGE

- file and/or drawing for CAD/CAM applications
- gears drawings
- cams drawings
- threads and fasteners (e.g. bolts, pins, and keys) use and applications
- drawings for metal bending and fabricating
- standard fits, finishes, and tolerances to a machine drawing applications
- manufacturing processes (e.g. machine, metal forming, and CNC)

T20 Pattern development encompassing:

- principles, concepts and purpose of pattern development
- terms, conventions and codes related to pattern development
- types and usage techniques of pattern development and related drawings
- application of pattern development and intersection techniques
- intersections of geometric surfaces development techniques and applications
- flat surfaces development techniques and applications
- construct of objects from the intersection

T21 Maps and profiles design and production to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of maps and profiles design and production
- terms, conventions and codes related to maps and profiles design and production
- maps and profiles design and production types and uses
- rules for cartography
- components selection and transit usage
- symbols usage and applications for topography
- application of properties and relationships of triangles to solve geometric problems; trigonometric relations to solve right triangles, law of sines and cosines to solve triangles

T22 Pipe/plumbing drawings basics encompassing:

- principles, purpose, terms and conventions usage in pipe/plumbing drawings
- applicable codes, symbols and abbreviations
- piping symbols, fittings, fixtures, and valves
- types of piping systems and usage techniques in pipe drawings
- principles of pneumatics and hydraulics
- pneumatics and hydraulic schematics production
- plumbing schematics production
- techniques and applications in creating drawings of piping symbols and systems

T23 Structural steel, welding and sheet metal drawings basics encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- principles, terms and conventions usage in structural steel, welding and sheet metal drawings
- applicable codes (e.g. OHS, Standards Australia/Zealand, building codes and regulations, related standards and codes)
- classification of major structural and welding components
- rules and symbols used in structural and welding drawings
- structural steel shapes
- steel-framing materials
- detail and assembly drawings (including beam connections) with bill of materials
- steel frame plan drawings production
- types and usage techniques of structural and welding drawings
- techniques and applications in creating structural drawings using measuring, labeling, and symbol procedures
- techniques and applications used in drafting the processes for joining metal and standard symbols for welding
- techniques and applications in creating welding drawings complete with weld symbols
- sheet metal layout methods and procedures
- representative sheet metal drawings
- sheet metal drawings for CAD/CAM applications

T24 Ink overlay drawings produced to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of ink overlay drawings production
- terms, conventions and codes related to ink production
- drawing specifications identification and analysis
- rapid graph equipment usage procedures

T25 Drawings reproductions to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of drawing reproductions
- terms, conventions and codes related to processes related to drawing reproductions
- rules for reproducing drawings
- various machines usage and selection in the reproduction process

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Prepare electrotechnology/ utilities engineering drawings using manual drafting and CAD applications as described in 8) Range and including:

A

Carrying out freehand sketching of simple electrotechnology/ utilities products, and components using pictorial methods to generate two and three dimensional electrotechnology/ utilities images encompassing a range of standard components, such as devices, components, parts, equipment and structures, sketched together with other solid and hollow

- items.
- B Preparing and modifying preliminary electrotechnology/
utilities drawings and diagrams using manual drafting
methods, techniques, procedures and devices
 - C Preparing and modifying preliminary electrotechnology/
utilities drawings and diagrams using computer-aided design
equipment and software
 - D Notating type, form and size of materials from information,
abbreviations and symbols supplied on electrotechnology/
utilities drawings, briefs and/or specifications.
 - E Obtaining specifications from design information, customer
requirements, sketches, preliminary layouts and/or field
investigations.
 - F Drawing single part components, simple electrotechnology/
utilities assemblies for fabrication, assembly or installation of
products encompassing dimensions, fabrication and/or
installation notes, and parts lists from predetermined
dimensions, associated tolerances and design specifications
 - G Using CAD equipment and related commands and drawing
environments to produce setting out details; drawing
template for a range of paper sizes, the drawing title and
scale used, date of drawing and other relevant information;
and/or working drawings
 - H Stating the purpose and usage of a variety of atypical
electrotechnology/ utilities drawings for electrotechnology
and electricity supply industry applications
 - I Generating a variety of CAD drawings from 2D components
to 3D models by applying relevant techniques and processes,
extracting properties, applying basic rendering techniques
and incorporating pre-prepared symbols to construct
electrotechnology/ utilities diagrams and assembly drawings
to produce section, surface modelling, solid modelling, and
wireframe modelling views
 - J Applying safety precautions when working with CAD
equipment

**Context of and
specific
resources for
assessment** **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to preparing electrotechnology/ utilities engineering drawings using manual drafting and CAD applications

**Method of
assessment** **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering the preparing electrotechnology/ utilities engineering drawings using manual drafting and CAD applications

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the preparation of electrotechnology/utilities engineering drawings using manual drafting and CAD applications:

- Covers mechanical, fabrication, fluid power
- Drawings include component drawings for fabrication, assembly and sub-assembly drawings, installation drawings, fault location aids such as flow diagrams and modifications (version control), and conversion between drawing types
- Engineering drafting specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards for electrotechnology/ utilities applications
- Manual drafting methods, techniques, procedures and devices
- Type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology / utilities related engineering drawings, briefs and/or specifications
- Sketching methods, techniques, procedures and devices encompassing freehand sketching
- Specifications may be obtained from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- Geometric construction
- Multi-view orthographic projections
- Auxiliary views
- Descriptive geometry/revolutions
- Sectional views/conventions
- Pictorial drawings
- Dimensioning/size description and tolerancing
- Development layouts
- Layout drawings
- Technical illustrations
- Graphs and charts
- Thread representations
- Working drawings
- Technical drawing equipment including computer-aided drawing design (CAD) applications, peripherals and devices
- Care and use of equipment

RANGE STATEMENT

- Safety precautions when working with CAD equipment
- Fabrication drawings
- Pattern development
- Maps and profiles design
- Pipe/plumbing drawings
- Structural steel and sheet metal drawings
- Ink overlay drawings production
- Drawings reproductions
- Organisational procedures for preparation and production of drawings, drawing sets, specifications, drafting documentation and operating and maintenance instructions/manuals for products and systems
- Organisational procedures for processing, filing and saving all graphics, specifications, instructions and related documentation in correct format and location in accordance with work site procedures
- Organisational procedures for collaborating with the client, key stakeholders and other staff in the selection of the preferred option

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Electrotechnology

UEENEEE191A Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers the preparation of, and modification of, preliminary electrotechnology/utilities drawings and diagrams using manual drafting methods, techniques, procedures and devices and computer-aided design equipment and software from specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEED1 Use software for engineering applications
04A

UEENEEEE1 Apply Occupational Health and Safety
01A regulations, codes and practices in the
workplace

UEENEEEE1 Fabricate, dismantle, assemble of utilities
02A industry components

UEENEEEE1 Solve problems in d.c. circuits
04A

UEENEEEE1 Use drawings, diagrams, schedules,
07A standards, codes and specifications

UEENEEEE1 Prepare engineering drawings using
90A manual drafting and CAD for
electrotechnology/utilities applications

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
Performance Criteria describe the required performance needed to demonstrate achievement of the element.
Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software	1.1	OHS procedures for a given work area are identified, obtained and understood
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed
	1.3	The extent of the work is determined from project specifications and discussion with appropriate personnel
	1.4	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
	1.5	Software tools and equipment a needed for the work are obtained in accordance with established procedures
2 Prepare electrotechnology/utilities drawings using manual drafting and	2.1	OHS risk control measures and procedures for carrying out the work are followed
	2.2	The types of design detailed drawings and layouts

ELEMENT	PERFORMANCE CRITERIA
CAD equipment and software.	required are determined from project specifications
	2.3 Technical data of system components is interpreted to determine parameters that are to be included in the detailed drawings
	2.4 Appropriate software tools are used to produce detailed drawings based on standard protocols
	2.5 Detailed drawings are checked for accuracy are compliance with project specifications
	2.6 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
	3 Complete electrotechnology/utilities drawings using manual drafting and CAD equipment and software
3.1 Completed drawings are submitted to an appropriate person to be checked for accuracy and compliance with project specifications.	
3.2 Any alterations, additions or correction instructions are followed and drawings are re-submitted for final approval	
3.3 Copies of completed drawings are filed securely in accordance with established procedures	

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and the preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE191A **Electrotechnology/ utilities drawings and diagrams**

Evidence shall show an understanding of electrotech/utilities drawings and diagrams to an extent indicated by the following aspects

T1 Electrotechnology/ utilities drafting fundamentals encompassing:

- principles, concepts and purpose of electrotechnology/ utilities drafting
- terms, conventions and codes related to electrotechnology/ utilities drafting
- rules and symbols used in electrotechnology/ utilities drafting
- types and usage techniques of electrotechnology/ utilities drawings
- techniques and applications for creating graphic symbols charts
- techniques and applications in composing block diagram drawings

T2 Standard drawing sheets and drawing sheet layout encompassing

- standard drawing sheet borders
- standard drawing sheet scale
- standard drawing sheet editing - routine
- standard drawing sheet editing - title block
- standard drawing sheet editing - revision blocks
- drawing sheet layout for small electrotechnology/ utilities projects
- drawing sheet layout for large electrotechnology/ utilities projects
- drawing sheet layout for signing and markings projects
- key plan sheets
- drawing layers
- line types

T3 Electrotechnology/ utilities drawings line work, symbols, lettering and techniques production to Australian/New Zealand and industry standards encompassing:

- principles of correct drafting technique
- principles, concepts and purpose of electrotechnology/ utilities drawings
- terms, symbols (including sectional symbols), conventions and codes related to electrotechnology/ utilities drawings

REQUIRED SKILLS AND KNOWLEDGE

- rules for drafting electrotechnology/ utilities drawings
- types and usage techniques of electrotechnology/ utilities drawings
- relationship between components and symbols used in drafting applications
- techniques and applications for production of electrotechnology/ utilities drawings

T4 Sketching techniques for electrotechnology/ utilities applications encompassing:

- lines and letters
- shapes
- solids
- axonometric views
- building sketch
- isometric views
- object sketch
- perspective; building interior perspective sketch
- detail labelled sketch

T5 Pole and structure elevations encompassing:

- elevation sheet layout
- elevation labeling
- concrete bases
- luminaire pole elevations
- signal pole elevations
- service pole elevations
- sign pole elevations
- sign bridge and cantilever elevations
- breakaway sign structures
- wood post sign structures

T6 Survey base plan drawings encompassing:

- survey base plan scale
- survey base plan
- survey base plan contents
- modelspace and paperspace
- external reference (xref) drawings
- viewports

T7 Auxiliary Views and Revolutions encompassing:

- principles, concepts and purpose of auxiliary views and revolutions
- terms, conventions and codes related to auxiliary views and revolutions
- rules of revolutions
- types and usage techniques of auxiliary views, auxiliary reference planes and revolutions

REQUIRED SKILLS AND KNOWLEDGE

- techniques and applications in finding the true size of an oblique surface
- secondary auxiliary view drawing techniques and applications
- applications of revolutions
- usage of the axis of revolution to draw the true shape of an oblique view

T8 Map Drafting encompassing:

- types and usage techniques of map drafting and illustrated maps
- techniques and applications of plat surveys and set plans
- techniques and applications of contour maps using profile coordinates
- map reading techniques and applications
- map drawing techniques and applications

T9 Civil/GIS (Geographic Information Systems) drawings basics encompassing:

- principles, terms and conventions usage in civil GIS drawings
- land surveying techniques (e.g. property line, corners, symbols, coordinates, base line, and typical sections)
- GIS and Global Positioning Systems (GPS) uses and applications
- land survey plot production from a written description
- manual and computer methods calculation of area
- contour plans
- profile drawings

T10 Architectural and site plan drawings for electrotechnology/ utilities applications encompassing:

- principles, purpose, terms and conventions usage in basic architectural drawings
- typical scales
- base plan symbols and labels
- electrotechnology/ utilities site plan symbols and labels
- signing and markings site plan symbols and labels
- architectural design and planning principles
- elevation drawings
- architectural symbols and abbreviations usage
- floor plans layout and production
- basic construction terminology and materials
- perspectives and pictorials
- typical wall and building sections with necessary details
- applicable building codes
- as-built floor plan measurement, sketching, and drafting
- usage of schedules in freehand architectural style lettering
- styles of architecture
- fundamentals and design function in residential design
- site plans production

REQUIRED SKILLS AND KNOWLEDGE

- foundation plan production

T11 AutoCAD basics for electrotechnology/ utilities applications encompassing:

- operating system fundamentals encompassing: principals, concepts and applications of CAD hardware; terms, conventions and codes related to CAD hardware; CAD hardware type and variation; system specifications interpretation and usage; I/O devices identification; computer components installation and configuration arrangements and application
- CAD filing and naming conventions
- opening program/closing and saving drawings
- basic drafting commands encompassing: line; circle; spline; rectangle
- basic modification commands encompassing: erasing; copy; mirror; block; trim; extend
- layout and plotting
- design centre encompassing: electrical symbols; electronic symbols
- AutoCAD and lists
- components and symbols in CAD
- mass storage and file compression
- network operating systems, protocols, and cabling systems
- researching hardware and software
- installation and configuration of operating systems
- plotting solutions
- security issues
- system maintenance
- user interface
- object creation and modification
- editing
- layers
- properties
- paper space and model space concepts
- dimensioning and dimensioning variables
- blocks
- attributes
- three dimensional construction
- solid modelling and scripts
- library construction
- database manipulation
- data extraction
- circuit simulation
- wiring symbols - motor and generator, AC and DC; wiring junctions; grounds; distinguishing power and control conductors; normally open and normally closed contacts; series and shunt coils; circuit protection devices - overload relay

REQUIRED SKILLS AND KNOWLEDGE

w/thermal element, fuse, circuit breakers; push button - disconnect switches, momentary contact, maintained contact; meters; resistors; transformers - power, current, potential, auto-transformers

T12 Drawing numbering, file names and digital file storage encompassing:

- drawing series and version control
- drawing sheet numbering
- drawing file names
- drawing storage
- drawing file

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being

assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software as described in 8) Range and including:

A

Carrying out freehand sketching of simple electrotechnology/ utilities products, circuits and components using pictorial methods to generate two and three dimensional electrotechnology/ utilities images encompassing a range of standard components, such as devices, components, parts, equipment and structures,

- sketched together with other solid and hollow items.
- B Preparing and modifying preliminary electrotechnology/utilities drawings and diagrams using manual drafting methods, techniques, procedures and devices
- C Preparing and modifying preliminary electrotechnology/utilities drawings and diagrams using computer-aided design equipment and software
- D Notating type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology/ utilities drawings, briefs and/or specifications.
- E Obtaining specifications from design information, customer requirements, sketches, preliminary layouts and/or field investigations.
- F Drawing single part components, simple electrotechnology/ utilities assemblies and circuits for fabrication, assembly or installation of products encompassing dimensions, fabrication and/or installation notes, wiring schedules and parts lists from predetermined dimensions, associated tolerances and design specifications
- G Using CAD equipment and related commands and drawing environments to produce setting out details; drawing template for a range of paper sizes, the drawing title and scale used, date of drawing and other relevant information; and/or working drawings
- H Stating the purpose and usage of a variety of typical electrotechnology/utilities drawings for electrotechnology/ utilities industry applications
- I Generating a variety of CAD drawings from 2D components to 3D models by applying relevant techniques and processes, extracting properties, applying basic rendering techniques and incorporating pre-prepared symbols to construct electrotechnology /utilities diagrams and assembly drawings to produce section, surface modelling, solid modelling, and wireframe modelling views
- J Applying safety precautions when working with CAD equipment

**Context of and
specific
resources for
assessment** **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software

**Method of
assessment** **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering the development of electrotechnology/utilities drawings is required.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software:

- Drawings include layouts, assembly and installation drawings, and modifications (version control), and conversion between drawing types
- Electrotechnology drafting specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards
- Manual drafting methods, techniques, procedures and devices
- Type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology drawings, briefs and/or specifications
- Sketching methods, techniques, procedures and devices encompassing freehand sketching
- Specifications may be obtained from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- Electrotechnology drawings line work, symbols, lettering and techniques
- Sketching techniques
- Technical drawing equipment including computer-aided drawing design (CAD) applications, peripherals and devices including AutoCAD basics for electrotechnology applications and related commands
- Safety precautions when working with CAD equipment
- Pole and structure elevations
- Survey base plan drawings
- Auxiliary Views and Revolutions
- Map Drafting
- Civil/GIS (Geographic Information Systems) drawings basics
- Architectural and site plan drawings
- Organisational procedures for preparation and production of drawings, drawing sets, specifications, drafting documentation and operating and maintenance instructions/manuals for products and systems
- Organisational procedures for processing, filing and saving all graphics, specifications, instructions and related documentation in correct format and location in accordance with work site procedures
- Organisational procedures for collaborating with the client, key stakeholders and other staff in the selection of the preferred option

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Electrotechnology

UEENEEE192A Produce detailed electrotechnology /utilities drawings using computer aided design equipment and software

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers the production of, and modification and maintenance of, detailed electrotechnology/utilities drawings and diagrams using computer-aided design (CAD) equipment and software from specifications, layouts, sketches or verbal instructions in conformance with Australian Standards, enterprise standards and/or design brief.

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEED1 Use software for engineering applications
04A

UEENEEEE1 Apply Occupational Health and Safety
01A regulations, codes and practices in the
workplace

UEENEEEE1 Fabricate, dismantle, assemble of utilities
02A industry components

UEENEEEE1 Solve problems in d.c. circuits
04A

UEENEEEE1 Use drawings, diagrams, schedules,
07A standards, codes and specifications

UEENEEEE1 Prepare engineering drawings using
90A manual drafting and CAD for
electrotechnology/utilities applications

UEENEEEE1 Prepare electrotechnology/utilities
91A drawings using manual drafting and CAD
equipment and software

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to produce detailed electrotechnology /utilities drawings	1.1 OHS procedures for a given work area are identified, obtained and understood
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed
	1.3 The extent of the work is determined from project specifications and discussion with appropriate personnel
	1.4 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
	1.5 Software tools and equipment a needed for the work are obtained in accordance with established procedures

ELEMENT	PERFORMANCE CRITERIA
2 Produce detailed electrotechnology /utilities drawings.	2.1 OHS risk control measures and procedures for carrying out the work are followed
	2.2 The types of design detailed drawings and layouts required are determined from project specifications
	2.3 Technical data of system components is interpreted to determine parameters that are to be included in the detailed drawings
	2.4 Appropriate software tools are used to produce detailed drawings based on standard protocols
	2.5 Detailed drawings are checked for accuracy are compliance with project specifications
	2.6 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
3 Complete detailed electrotechnology /utilities drawings.	3.1 Completed detailed drawings are submitted to an appropriate person to be checked for accuracy and compliance with project specifications.
	3.2 Any alterations, additions or correction instructions are followed and detailed drawings are re-submitted for final approval
	3.3 Copies of completed detailed drawings are filed securely in accordance with established procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and using drawings, diagrams, schedules and manuals.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE192A Detailed electrotechnology /utilities drawings

Evidence shall show an understanding of detailed electrotechnology /utilities drawings to an extent indicated by the following aspects

T1 Detailed working drawings encompassing:

- definition of detailed working drawings
- usage and types of detailed working drawings
- composition and layout of detailed working drawings
- preparation of detailed working drawings

T2 Advanced (master) sketching techniques encompassing:

- lines and letters
- shapes
- solids
- axonometric views
- building sketch
- isometric views
- object sketch
- perspective; building interior perspective sketch
- detail labelled sketch
- complex surfaces with tangent and curvature continuities
- surfaces manipulation using editing tools
- surfaces analysis for quality and desired characteristics

T3 Drafting/modelling electrotechnology/ utilities encompassing:

- standard documentation practices for block diagrams
- wiring diagrams
- circuit schematics
- control circuits
- creating one-line diagrams
- standard PCB layouts
- printing wiring assemblies
- art masters

REQUIRED SKILLS AND KNOWLEDGE

T4 Electrotechnology/ utilities related drawings encompassing:

- charts and graphs; encompassing alternating current, frequency, electromagnetisms, signals, transmission
- measuring devices and gauges
- power sources, transformers, alternators, motors and related applications
- earthing
- conduits, boxes and fittings, harnesses, cable trays and ducts
- conductor terminations, splices, installations and wiring schedules
- busways
- electric services installations
- protection devices -over current and voltage, circuit breakers, and fuses
- switches, contactors and relays
- control systems and devices
- HV devices and apparatus
- cabinet and panel layouts
- plot and floor plans
- electric lighting
- analogue and digital systems, circuits, electronic components and devices - connections; resistors; capacitors; magnetic devices; piezoelectric devices, crystals and resonators; transducers, sensors and detectors; solid state components and semiconductors; display technologies – filament, LED, LCD, discharge devices, thermionic valves, vacuum tubes; assemblies, modules; prototyping aids; mechanical accessories
- data networks, communication and telecommunications equipment and devices
- pneumatic and hydraulic circuits, including related piping ware and components

T5 AutoCAD – functional for electrotechnology/ utilities encompassing:

- user coordinates systems
- Right-Hand Rule
- 2D geometry extrusion
- 2D views from 3D models and visa-versa
- user coordinate systems creation
- 3D wireframe geometry creation
- 3D faces on wireframe geometry placement
- 3D geometry viewing
- surfaces construction
- working drawings generation
- drawing set up using model space and paper space; encompassing printing and plotting
- plotting
- rendering

REQUIRED SKILLS AND KNOWLEDGE

- 3D models construction
- 3D surface models construction
- 3D models display from different vantage points
- orthographic drawings constructed from 3D models
- rendered images creation
- solid modelling construction using Boolean operations
- scripts writing and tool button macros application
- organisation of writing scripts and tool button macros commands
- advanced drawing, editing, and configuration procedures application
- basic user-level system customisation
- design environment
- basic workflow

T6 AutoCAD – project basics encompassing:

- project manager
- project drawing list
- projects progression/stages
- projects copy and activation

T7 AutoCAD – schematic wiring, editing, components and reporting encompassing:

- wiring and ladders
- wire types, wire numbers
- source and destination signal arrows
- multiple phase and multi wire circuits
- circuits
- connectors and point-2-point wiring
- basic editing utilities
- miscellaneous tools
- data tools
- re-sequence and retag drawings
- using the auditing tools
- schematic symbol annotation
- inserting schematic symbols
- swapping and updating blocks
- inserting schematic components from lists
- generating schematic reports

T8 AutoCAD – panel layouts encompassing:

- creating panel layouts from schematic lists
- din rail utility usage
- panel footprints

REQUIRED SKILLS AND KNOWLEDGE

- terminal strip editor usage
- panel layout annotation and reports

T9 AutoCAD – PLC modules encompassing:

- PLC I/O modules
- PLC modules builder
- PLC database file editor; encompassing insert and edit in parametric PLC modules, nonparametric PLC modules, and stand-alone PLC I/O points
- PLC I/O address-based tagging
- spreadsheet to PLC I/O utility

T10 AutoCAD - detailed settings and configurations – advanced commands encompassing:

- drawing properties
- project properties
- creating wire types
- reference files usage
- creating drawing templates
- installation and search paths

T11 AutoCAD – detailed customised components and customised detailed data encompassing:

- schematic symbols
- icon menu system
- panel footprints
- part catalogue databases usage
- pin list database editor
- title block update and attributes
- terminal properties editor
- reference files usage

T12 AutoCAD – advanced auditing tools, automation tools and integration encompassing:

- auditing tools
- trouble shooting tools
- updating schematics from spreadsheets
- generating automatic reports
- AutoCAD integration
- din rail editor
- footprint with wire annotation
- conduit tools
- cables management

REQUIRED SKILLS AND KNOWLEDGE

T13 AutoCAD – database management and productivity tools encompassing:

- title block attributes automation tools update
- schematics update spreadsheets
- adding wire data to footprints
- managing cables
- using the circuit builder
- working with peer-to-peer

T14 Drawings production using CAD application programs encompassing:

- principals, concepts and applications of drawings production using CAD application programs
- terms, conventions and codes related to drawings production using CAD application programs
- drawing production types using CAD application programs
- CAD advanced commands identification and application for drawings
- CAD advanced commands identification and application for editing drawings
- CAD advanced commands identification and application for hardcopy drawings
- techniques and applications in producing detailed architectural drawings of a floor plan, elevation, and exterior wall section for a residential structure related to electrotechnology/ utilities applications

T15 Utility programs disk and file management encompassing:

- principals, concepts and applications of disk and file management of utility programs
- terms, conventions and codes related to disk and file management of utility programs
- disk operating system commands identification and usage
- utility commands identification and usage
- commands for word processing identification and usage

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Producing detailed electrotechnology /utilities drawings using computer aided design equipment and software as described in 8) Range and including:

A Producing, modifying and maintaining detailed electrotechnology/ utilities drawings and diagrams using computer-aided design (CAD) equipment and software

B Producing master sketches of complex electrotechnology/ utilities drawings using pictorial methods and scaling to

	generate relevant dimensional electrotechnology/ utilities images
C	Identifying, selecting and determining uses for a range of materials and equipment used in electrotechnology/ utilities engineering drafting applications
D	Drawing single and multi-part components and detailed electrotechnology/ utilities assemblies
E	Using advanced CAD equipment commands and drawing techniques and processes to produce detailed electrotechnology/utilities drawings
F	Using filing systems for managing, entering and/or retrieving technical information from computer related database programs
G	Applying safety precautions when working with CAD equipment

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to using drawings, diagrams, schedules and manuals.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering the production of detailed drawings using computer aided design equipment and software for other disciplines.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to producing detailed electrotechnology /utilities drawings using computer aided design equipment and software covering:

- Drawings include detailed circuit and wiring diagrams/schedules, block diagrams, schematics, printed circuit board layouts, assembly and installation drawings, modification drawings, and conversion between drawing types.
- Electrotechnology/ utilities specifications, layouts, sketches or verbal instructions in conformance with Australian Standards, enterprise standards and/or design brief.
- Master sketches methods, techniques, procedures and devices encompassing freehand sketching
- Type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology/ utilities engineering drawings, briefs and/or specifications
- Specifications may be obtained from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- Materials and equipment used in electrotechnology/ utilities engineering applications by selecting the correct type, form and size of materials and equipment from information, abbreviations and symbols supplied on detailed electrotechnology/ utilities engineering drawings, briefs and/or specifications
- Advanced computer-aided design (CAD) equipment commands and drawing techniques and processes
- CAD application programs and advanced tools
- Utility programs disk and file management
- Filing systems management including entering/retrieving technical information from computer related database programs for the production, modification and/or maintenance of detailed electrotechnology/ utilities drawings
- Safety precautions when working with CAD equipment
- Detailed working drawings
- Drafting/modelling electrotechnology/ utilities
- Detailed electrotechnology/ utilities drawings including a representative array of relevant 2D and 3D CAD drawings
- Single and multi-part components and detailed electrotechnology/ utilities assemblies for fabrication, assembly, installation and/or modification of products encompassing dimensions encompassing dimensions; fabrication,

RANGE STATEMENT

- assembly, installation and/or modification notes, circuit/wiring layouts/schedules and parts lists from specified dimensions, associated tolerances and design specifications.
- Architectural drawings for electrotechnology/ utilities applications
 - Organisational procedures for preparation and production of drawings, drawing sets, specifications, drafting documentation and operating and maintenance instructions/manuals for products and systems
 - Organisational procedures for processing, filing and saving all graphics, specifications, instructions and related documentation in correct format and location in accordance with work site procedures
 - Organisational procedures for collaborating with the client, key stakeholders and other staff in the selection of the preferred option

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Electrotechnology

UEENEEF106A Solve problems in voice and data communications circuits

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers providing known solutions to predictable problems in single and multiple path circuits operated at extra-low voltage as they apply to various voice and data communications work functions. It encompasses working safely, problem solving procedures, including the use of basic voltage, current and resistance measuring devices, providing known solutions to predictable communication circuit problems.

Application of the Unit

Application of the Unit 2)

This unit shall apply to persons entering work in electrotechnology and may be used in school based vocational programs.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However they are subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to work on extra-low voltage voice and data communications circuits	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve problems in extra-low voltage voice and data communications circuits	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established routines are used to solve circuit problems using measured and calculated values

ELEMENT	PERFORMANCE CRITERIA
	as they apply to single path, single source circuits.
	2.5 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to solve circuit problems is documented.
	3.4 Work completion is documented and appropriate person(s) notified in accordance with established routine procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in extra-low voltage voice and data communications circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EF106A

Electrotechnology communication principles

Evidence shall show an understanding of electrotechnology communication principles, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. The basic electrical circuit

- basic circuit components
- function of basic circuit components
- connection of components
- measurement of circuit parameters
- open-circuit, closed-circuit and short-circuits.

T2. Circuit parameter relationships

- Ohms Law
- calculation of voltage, current and resistance
- power dissipated
- calculation of power.

T3. Measurement instruments (voltage, current & resistance)

- safe working procedures
- handling and storing instruments
- selecting and set up of instruments
- connecting instruments
- read analogue scales and digital readouts.

T4. Effects of electrical current

- physiological effect
- heating effect
- magnetic effect
- chemical effect
- typical uses

T5. EMF sources

- basic generator
- basic thermocouple

REQUIRED SKILLS AND KNOWLEDGE

- photovoltaic cells
- piezo electric
- primary and secondary cells.

T6. D.C. resistive circuits

- series circuits (set-up, measurement and calculations)
- parallel circuits (set-up, measurement and calculations)
- series-parallel circuits (set-up, measurement and calculations).

T7. Capacitance

- construction of capacitors
- operation of capacitors
- units
- charge of a capacitor
- RC series circuit.

T8. Magnetism and electromagnetic induction

- permanent magnets
- electromagnetism
- induced emf
- inductors
- principles of inductance
- unit of inductance
- electromagnetic radiation (EMR)
- cross talk.

T9. A.C. principles

- generation of sinusoidal voltage
- a.c. circuit parameters – frequency, period, amplitude, instantaneous value, maximum value, peak value, peak to peak value and rms value
- calculation of frequency and rms values
- effects of frequency on inductors
- effects of frequency on capacitors
- transformers construction and operating principles.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Solve problems in solving problems in extra-low voltage data and voice communications circuits as described in 8) and including:
 - A Determining the operating parameters of an existing circuit.
 - B Determining the frequency response of existing circuits

- C Altering an existing circuit to comply with specified operating parameters.
- D Developing circuits to comply with a specified function and operating parameters.
- E Identifying earth faults.
- F Identifying loss of supply.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solve problems in extra-low voltage voice and data communications circuits.

Method of assessment 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

Single source single and multiple path communication circuits as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following disciplines:

- Voice and Data Communications
- Electronics
- Fire protection
- Renewable and sustainable energy systems, and
- Security technology
- In relation to at least three of the following types of communication circuit problems and on at least two occasions:
 - Determining the operating parameters of an existing circuits
 - Determining the frequency response of an existing circuits
 - Identifying and locating open-circuits
 - Identifying and locating short-circuits
 - Identifying earth faults
 - Identifying loss of supply

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Data and Voice Communications

UEENEEF107A Set up and configure the wireless capabilities of communications and data storage devices

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers entering instructions in wireless devices with simple built-in programming function and verifying that the device operates as intended. It encompasses safe working practices, checking device software installation, following written and oral instruction and procedures and completing necessary documentation.

Note: Examples of wireless devices are personal digital assistants(PDAs), mobile phones, personal computers(PCs) remote controls etc

Application of the Unit

Application of the Unit 2)

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a registration to practise in the workplace subject to requirements set out ACMA 'Open' Cabling Provider Rule. Practice in workplace and during training is also

License to practice

3)

subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to enter operating instructions.	1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures. 1.2 Established OHS risk control measures and procedures in preparation for the work are followed. 1.3 Safety hazards that have not previously been identified are reported and advise on risk control measures are sought from the work supervisor. 1.4 Work supervisor or customers are consulted to determine which functions of the device are to be use and the parameter of each. 1.5 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.

ELEMENT	PERFORMANCE CRITERIA
	1.6 Device installation is checked for compliance with job specification and regulations where they apply.
2 Enter operating instructions.	2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.3 The required status of each function of the device is entered and their parameters set in accordance with manufactures programming instructions.
	2.4 Entered data are checked as meeting those specified by the work supervisor or customer.
	2.5 Procedures for referring non-routine events to immediate supervisor for directions are followed.
3 Test device operation and report.	3.1 Device operation is tested in strict accordance OHS requirements and procedures.
	3.2 Operating anomalies are identified and corrected in accordance with established routines.
	3.3 OHS work completion risk control measures and procedures are followed.
	3.4 Work site is cleaned and made safe in accordance with established procedures.
	3.5 Work completion is reported and appropriate person(s) notified in accordance with established routines.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and set up and configuring the wireless capabilities of communications and data storage devices.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies..

KS01-EF107A

Wireless devices

Evidence shall show an understanding of wireless devices, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

- T1. Types and applications
- T2. Operating principles at sub-system level
- T3. Programming functions
- T4. Networking set up

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work

environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control

measures as specified in the performance criteria and range statement

- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Set up the wireless capabilities of communications and data storage devices as described in 8) and including:

- | | |
|---|---|
| A | Understanding required operating functions and parameters. |
| B | Identifying non-compliance conditions of device installation. |
| C | Entering functions and parameters correctly. |
| D | Correcting programming anomalies. |
| E | Testing and verify device operation. |
| F | Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items |

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

**Context of and
specific
resources for
assessment** **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to setting up the wireless capabilities of communications and data storage devices.

**Method of
assessment** **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to entering and verifying operating instruction in at least two types of microprocessor equipped devices with built-in icon-based programmable functions such as programmable relays, timers, temperature controllers, detection devices for security and fire.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Data and Voice Communications

UEENEEG006A Solve problems in single and three phase low voltage machines

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers ascertaining correct operation of single and three phase machines and solving machine problems as they apply to servicing, fault finding, installation and compliance work functions. It encompasses safe working practices, machine connections circuit arrangements, issues related to machine operation, characteristics and protection and solutions to machine problems derived from calculated and measured parameters.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

- UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace
- UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components
- UEENEEE104A Solve problems in d.c circuits
- UEENEEE105A Fix and secure electrotechnology equipment
- UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications
- UEENEEG101A Solve problems in electromagnetic devices and related circuits
- UEENEEG102A Solve problems in low voltage a.c. circuit

Prerequisite Unit(s) 2)

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

Employability Skills Information**Employability Skills** 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)**4.1) General Application**

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to solve single and three phase low voltage machines problems.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
	1.4 The nature of the machine (s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.6 Sources of materials that may be required for the work are established in accordance with established procedures.
	1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve single and three phase low voltage machine problems.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established methods are used to solve machine problems from measure and calculated values as they apply to single and three-phase low voltage machines.
	2.5 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.

ELEMENT**PERFORMANCE CRITERIA**

- | | | |
|---|--|---|
| | 2.6 | Unexpected situations are dealt with safely and with the approval of an authorised person. |
| | 2.7 | Problems are solved without damage to machines, circuits, the surrounding environment or services and using sustainable energy practices. |
| 3 | Complete work and document problem solving activities. | |
| | 3.1 | OHS work completion risk control measures and procedures are followed. |
| | 3.2 | Work site is cleaned and made safe in accordance with established procedures. |
| | 3.3 | Justification for solutions used to solve machine problems is documented. |
| | 3.4 | Work completion is documented and an appropriate person or persons notified in accordance with established procedures. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in single and three phase low voltage machines.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EG006A

Single and three-phase transformers

Evidence shall show an understanding of single and three phase transformers to an extent indicated by the following aspects:

T1 Transformer construction encompassing:

- types of lamination style and core construction used in single-phase, three phase, double wound, auto transformers and instrument transformers.
- identification of different winding styles/types used in transformers.
- methods used to insulate low and high voltage transformers.
- construction of transformer tanks for distribution transformers.
- transformer auxiliary equipment. (Bushings, surge-diverters, tap-changers, hot oil & winding indicators, breather, Buchholz relay and conservator).
- function of transformer auxiliary equipment.
- types of information stated on transformer nameplates.
- application of transformers.
- performing basic insulation resistance, continuity and winding identification tests.

T2 Transformer operation encompassing:

- principles of mutual induction of a transformer.
- factors that determine the induced voltage in a transformer winding.
- determining the value of a transformers secondary voltage and current given one winding's electrical details and turns ratio.
- identification of voltage and current components of a phasor diagram for a transformer on no-load.
- principles of power transferred from the primary to secondary when a load is connected using a phasor diagram neglecting impedance drops.
- selecting transformers for specific application/s.
- safety features specified in AS/NZS3000 with respect to transformers and isolating transformers.

T3 Transformer losses, efficiency and cooling encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- power losses which occur in a transformer.
- tests which allow the power losses of a transformer to be determine.
- determination of transformer losses and efficiency using test results.
- relationship between transformer cooling and rating.
- methods used for natural and forced cooling of transformers.
- properties of transformer oil.
- tests conducted on transformer oil.

T4 Transformer voltage regulation and percent impedance encompassing:

- voltage regulation as applicable to a transformer.
- reasons for voltage variation in the output of a transformer.
- determine the voltage regulation of a transformer from voltage and percentage impedance values.
- percentage impedance as applied to transformers.
- determine the percent impedance by using test results.
- determine percent impedance of a transformer by calculation.

T5 Parallel operation of transformers and transformer auxiliary equipment encompassing:

- determine polarity markings for an unidentified single phase double wound transformer.
- need for parallel operation of transformers.
- conditions/restrictions required before two transformers can be connected in parallel.
- connecting transformers in parallel to supply a single load (loading on transformers operating in parallel).
- the consequences/effect of an incorrect connection.

T6 Auto-transformers and instrument transformers encompassing:

- identification of auto-transformers, voltage transformers and current transformers from their winding diagrams.
- determining voltage and current in the windings of an auto-transformer by calculation.
- advantages and disadvantages of an auto-transformer.
- AS/NZS3000 requirements with respect to transformers.
- construction of voltage transformers.
- ratings of voltage transformers.
- construction of current transformers.
- ratings of current transformers.
- precautionary measures taken to connect and disconnect instrument transformers.
- connection diagrams for instrument transformers.
- applications for auto-transformers and instrument transformers.

REQUIRED SKILLS AND KNOWLEDGE

KS02-EG006A

Alternating current rotating machines

Evidence shall show an understanding of alternating current rotating machines to an extent indicated by the following aspects:

T1 Operating Principles of three phase induction motors encompassing:

- determining circuit operating characteristics by using the right hand (grip) rule for conductors and solenoids and Fleming's left and right hand rules.
- characteristics of the magnetic field produced by a single, two and three-phase windings.
- speed of rotation of a rotating magnetic field.
- relationship between the rotor speed, slip and rotor frequency.
- basic principle of operation of an induction motor.
- reversing the direction of rotation of a three phase induction motor

T2 Three phase induction motor construction encompassing:

- basic component parts of a three-phase induction motor.
- types of rotors used in three-phase induction motors.
- connecting three-phase induction motor in both star and delta.
- dismantling three-phase induction motors.
- testing insulation resistance of a three-phase induction motor prior to connection to the supply.
- testing winding resistance (ohmic value and continuity) of a three-phase induction motor prior to connection to the supply

T3 Three phase induction motor characteristics encompassing:

- relationship between torque, speed, and power and interpretation of speed/torque curves of induction motors.
- squirrel cage motors operating characteristics conditions necessary for an induction motor to produce maximum torque.
- operating characteristics of an induction motor from name plate information and by measurement.
- induction motors efficiency and minimum energy performance standards (MEPS).
- full load efficiency and power factor of induction motors.

T4 Single phase motors – split phase encompassing:

- common types of single phase motor.
- principles of operation of a split phase induction motor.
- construction and basic characteristics of a split phase induction motor.
- applications of split phase induction motors.
- connecting, running and reversing a split phase induction motor.

T5 Single phase motors – capacitor and shaded pole types encompassing:

- identification of single phase induction motors including capacitor start, capacitor

REQUIRED SKILLS AND KNOWLEDGE

start/capacitor run, permanent split capacitor (PSC) and shaded pole

- principles of operation of each motor type listed above.
- operating characteristics and typical applications of each motor type listed above.
- connection and running each type of motor listed.
- reversing the direction of rotation of each of the capacitor type motors.

T6 Single phase motors – universal encompassing:

- principles of operation of a series universal motor.
- identification and functions of each of the basic parts of a series universal motor.
- operating characteristics and typical uses for a series universal motor.
- connecting, running and reversing a series universal motor.

T7 Motor protection encompassing:

- reasons why motor protection is required.
- requirements of the AS/NZS3000 Wiring rules with regards to motor protection.
- types of motor overload protection.
- operating principles of microtherm devices, thermal and magnetic motor protection devices.
- electrical features of motor protection HRC fuses.
- effects of under voltage and over voltage on motors and motor circuits.
- effects of repetitive starting and/or reversing on motors.
- special requirements for motor protection, in high humidity or moist environments, high temperature areas and corrosive atmospheres.
- operating principles of phase failure protection.
- selecting suitable protective devices for a given motor and starter combination.

T8 Three phase synchronous machines- operation principles and construction encompassing:

- power transfer diagram of an a.c. synchronous machine.
- need for the generation of a sinusoidal waveform.
- principles of operation of a synchronous alternator.
- principles of operation of a synchronous motor.
- principles of operation of an asynchronous generator (induction generator).
- identification of main parts of a synchronous alternator/motor.
- methods used to provide the excitation of a synchronous alternator/motor.
- block diagram of an alternator voltage regulator.
- advantages gained by the parallel operation of alternators.
- starting methods of synchronous motors.

T9 Alternators and generators encompassing:

- effects on the generated voltage of variations in excitation.
- effects on generated voltage of variations in load.
- identification of characteristic curves of an alternator.

REQUIRED SKILLS AND KNOWLEDGE

- types of prime movers used with single and three phase portable/standby alternators.
- manual operation of single and three phase portable/standby alternators.
- ratings of single and three phase portable/standby alternators.
- applications of single and three phase portable/standby alternators.
- construction details of single and three phase portable/standby alternators.
- common faults found in portable/standby alternators.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on

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the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Solve problems in single and three phase low voltage machines as described as described in 8) and including:
 - A Determining the operating parameters of existing machines.
 - B Altering an existing machine to comply with specified operating parameters.

EVIDENCE GUIDE

- C Developing machines/circuits to comply with a specified function and operating parameters.
- D Determining the cause of low efficiency in an existing machine.
- E Determining conditions causing an existing circuit to be unsafe.
- F Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in single and three phase low voltage machines.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with

9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit

EVIDENCE GUIDE

other units

UEENEEE001B and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any four of the following problems in single and three-phase low voltage machine and circuits.

- Determining the operating parameters of existing machines
- Altering an existing machine circuit to comply with specified operating parameters
- Developing machine circuits to comply with a specified function and operating parameters

Note:

Operating parameters include voltage, current, torque, efficiency, power, energy and power factor

- Determining the cause of low efficiency in an existing machine.
- Determining problems in existing machines to malfunction

Note:

Problems include bearing noise/faults, vibration, undervoltage, unbalanced windings

- Determining conditions causing an existing machine/circuit to be unsafe.

Note:

Examples of unsafe circuits includes electric shock hazard from indirect contact with conductive parts, insufficiently low impedance of a fault current path and inadequate fault protection

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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2.2) Literacy and numeracy skills

Competency Field 5)

Electrical

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers ascertaining correct operation of single and three phase low voltage electrical apparatus and circuits and solving circuit problems as they apply to servicing, fault finding, installation and compliance work functions. It encompasses safe working practices, apparatus circuit arrangements, issues related to operation, characteristics and protection and solutions to apparatus/circuit problems derived from calculated and measured parameters.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101 A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102 A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104 A	Solve problems in d.c circuits
UEENEEE105 A	Fix and secure electrotechnology equipment
UEENEEE107 A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG101 A	Solve problems in electromagnetic devices and related circuits
UEENEEG102 A	Solve problems in low voltage a.c. circuit

Prerequisite Unit(s) 2)

UEENEEG106 A Terminate cables, cords and accessories
for low voltage circuits

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to solve single and three phase low voltage electrical apparatus/ circuit problems.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
	1.4 The nature of the apparatus/circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.6 Sources of materials that may be required for the work are established in accordance with established procedures.
	1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve single and three phase low voltage electrical apparatus/circuit problems.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Apparatus/circuits/plant is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established methods are used to solve apparatus/circuit problems from measure and calculated values as they apply to single and three-phase low voltage apparatus/circuit.
	2.5 Established methods for dealing with unexpected situations are discussed with appropriate person or

ELEMENT	PERFORMANCE CRITERIA
	persons and documented.
	2.6 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.7 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to solve apparatus/circuit problems is documented.
	3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in single and three phase low voltage electrical apparatus and circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EG033A

Electrical apparatus and circuits

Evidence shall show an understanding of electrical apparatus and circuits to an extent indicated by the following aspects:

T1 Lighting circuits – looping at the light/switch encompassing:

- the “loop at the light” method of wiring lighting circuits.
- the “loop at the switch” method of wiring lighting circuits
- wiring diagrams for the lighting circuit of an installation that incorporates one-way, two-way and two-way and intermediate switching of light points using the loop at the light/switch methods of TPS wiring.
- TPS cabling requirement for the loop at the light/switch circuit.
- installation methods of accessories and wiring for a lighting circuit incorporating one-way, two-way and two-way and intermediate switching of lighting points using the loop at the light/switch method of TPS wiring.
- correct operation of the install circuits including testing for correct compliance with Australian Standards.

T2 Circuits for socket outlets encompassing:

- the purpose of socket outlets.
- requirements concerning the polarity of switched socket outlets.
- correct cable size to supply 10 A, 15 A and 20 A socket outlets (single and three phase), for given installation conditions.
- number of socket outlets connected to a 16 A and 20 A circuit breaker.
- installation methods of a single phase socket outlet circuits.
- correct operation of the installed circuits including testing (dead testing only) for correct compliance with Australian Standards.

T3 Final sub-circuits and segregation encompassing:

- purpose of mixed circuits.
- circuit loading for a mixed circuit.
- purpose of segregation of circuits and the AS/NZS3000 requirements.

REQUIRED SKILLS AND KNOWLEDGE

- Installation methods a single phase mixed circuits.
- correct operation of the installed circuits including testing for correct compliance with Australian Standards.

T4 Electrical heating control devices encompassing:

- methods of manual heat control.
- methods of automatic heat control.
- types and application for common thermostats.
- operation of common thermostats.
- sensitivity and differential of thermostats.
- testing of a thermostat (including differential and correct operation)
- applications of simmerstats (infinite controls).
- operation of a simmerstat.
- electronic heat control (phase control and zero voltage switching).

T5 Fixed electrical heating appliances encompassing:

- Terms: heat energy, temperature, specific heat capacity, thermal conductivity and thermal stability.
- determining the heat energy in joules and kWh in a simple heating process.
- methods of heat transfer.
- Determining the heat energy input and output of a heating process.
- connections to a two phase stove.
- operation of reverse cycle air conditioning.

T6 Electrical water heater operation encompassing:

- types of water heaters (instantaneous and storage) and their methods of control.
- intrinsic safety (pressure relief and thermal cut-out).
- testing of over temperature cut-out point of a thermostat.
- switchboard requirements to supply a controlled load water heater.
- internal circuit of a twin element water heater, and supply connections.
- tariffs employed by local supply authorities.
- solar heating system and its integration into an installation.

T7 Alternative supplies encompassing:

- reasons for the installation of alternative supplies.
- types of alternative supply systems.
- characteristics and operation of UPSs.
- Australian Standards and local requirements for safety services supply systems.

T8 Installation of batteries encompassing:

- common types of primary cells and secondary batteries and typical applications.
- terminal voltage of common primary cells and secondary cells.
- correct storage, handling and disposal techniques for cells and batteries.

REQUIRED SKILLS AND KNOWLEDGE

- charge/discharge cycle for a secondary cell.
- effect of internal resistance on a secondary cell.
- state of charge of a secondary cell.
- installation of batteries as per AS/NZS3011
- commissioning procedures for various secondary batteries.
- safe working procedures when working with secondary cells and batteries.

T9 Fire protection – residential fire and smoke alarms encompassing:

- types of fire and smoke alarms.
- regulations and standards requirements regarding residential fire and smoke alarms.
- locations for residential fire and smoke alarms.
- wiring methods for residential fire and smoke alarms.
- operation of typical residential fire and smoke alarms

T10 Emergency and evacuation lighting and lighting control encompassing:

- factors and requirements of emergency and evacuation lighting concerning illumination levels, luminaire positioning and operating period.
- characteristics of maintained, non maintained and sustained emergency lighting systems.
- arrangement of batteries in point and central bank emergency lighting supply systems.
- lighting control methods

T11 Lighting concepts and incandescent lighting encompassing:

- basic concepts of lighting.
- terminology, principles and standards relevant to lighting (energy efficiency as per BCA new lamp types and permitted replacements and their efficacy)..
- basic types of luminaries.
- operation of an incandescent lamp.
- types of incandescent lamps.
- expected lamp life, colour rendering and efficacy for typical incandescent lamps.
- lighting layout in terms of visual comfort and relevant Australian standards

T12 Fluorescent low intensity discharge lighting encompassing:

- types of low intensity discharge lamps.
- expected lamp life, colour rendering and efficacy for typical types of low intensity discharge lamps.
- operation of low intensity discharge luminaires including their control equipment.
- Australian Standard and local requirements for low intensity discharge lighting.
- methods for satisfying Australian Standards and local supply authority requirements regarding low intensity discharge lighting.

T13 High intensity discharge lighting encompassing:

- types of high intensity discharge lamps.

REQUIRED SKILLS AND KNOWLEDGE

- expected lamp life, colour rendering and efficacy for typical types of high intensity discharge lamps.
- operation of high intensity discharge luminaires including their control equipment.
- Australian Standard and local requirements for high intensity discharge lighting.
- methods for satisfying Australian Standards and local supply authority requirements regarding high intensity discharge lighting.
- LED lighting and its applications.
- Neon, Argon and Xenon lighting and their applications.
- comparison of incandescent, low intensity discharge, high intensity discharge, LED and other types of lighting

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

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The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Solve problems in single and three phase low voltage electrical apparatus and circuits as described as described in 8) and including:
 - A Determining the operating parameters of existing apparatus/circuits.
 - B Altering an existing apparatus/circuit to comply with specified operating parameters.
 - C Developing apparatus/circuits to comply with a specified function and operating parameters.
 - D Determining the cause of low efficiency in an existing apparatus/circuit.
 - E Determining conditions causing an existing apparatus/circuit to be unsafe.
 - F Dealing with unplanned events

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in electromagnetic circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any four types of problems for both single and three-phase apparatus and circuits and three types of circuit/equipment as listed below.

- | | |
|------------------|--|
| Type of problems | <ul style="list-style-type: none">• Determining the operating parameters of existing apparatus/circuit• Altering an existing apparatus/circuit to comply with specified operating parameters• Developing apparatus/circuits to comply with a specified function and operating parameters |
|------------------|--|

Note:

Operating parameters include voltage, current, efficiency, power, energy and power factor

- Determining the cause of low efficiency in an existing apparatus/circuit.
- Determining conditions causing an existing apparatus/circuit to be unsafe.

Note:

Examples of unsafe circuits includes electric shock hazard from indirect contact with conductive parts, insufficiently low impedance of a fault current path and inadequate fault protection

- | | |
|-----------------------------|--|
| Types of circuits/equipment | <ul style="list-style-type: none">• Lighting circuits• Power circuits• Rotating machines• Electrical heating• Lighting |
|-----------------------------|--|

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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2.2) Literacy and numeracy skills

Competency Field 5)

Electrical

UEENEEG063A Arrange circuits, control and protection for general electrical installations

Modification History

Release	Action	Core/Elective	Details	Points
3	Edit		Adjust Performance Criteria numbering that was previously missing	

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the arrangement and termination of circuits, control and protection devices and systems for electrical installations operating at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses knowledge and application of schemes for protection of persons and property, correct functioning, ensuring compatibility with the supply, arranging installation into circuits and selecting and arranging switchgear/controlgear and protective devices to meet compliance requirements and documenting arrangement decisions.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components

UEENEEE104A Solve problems in d.c circuits

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

Prerequisite Unit(s) 2)

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuit

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to arrange electrical installations circuits, control and protection	1.1 The extent and nature of the electrical installation is determined from job specifications.
	1.2 Safety and other regulatory requirements to which the electrical installation shall comply are identified, obtained and understood.
	1.3 Load requirements for individual current-using equipment is determined from job specifications or from consultation with appropriate persons.
2 Arrange electrical installations circuits, control and protection	2.1 Circuits, control and protective devices are arranged to ensure safe and functional operation of the installation and to comply with technical standards and job specifications and requirements.
	2.2 Earthing is arranged and terminated to comply with the MEN system requirements.
	2.3 Protective devices are selected to meet the required switching and tripping currents, co-ordination and discrimination for overload and short-circuit protection.
	2.4 Residual current devices are selected to meet the required circuit, switching and tripping currents required.
	2.5 Switchgear/control gear is selected to meet current, voltage and IP ratings and functional requirements.
	2.6 Switchboards are arranged to accommodate control and protective devices, links, safety services, and other distributor equipment in accordance with requirements.
3 Document electrical installation circuits, control and protection arrangements	3.1 Evidence is obtained from manufacturers/suppliers that electrical equipment selected complies with safety requirements.
	3.2 Reasons for selections made, including calculations, are documented in accordance with

ELEMENT

PERFORMANCE CRITERIA

established procedures.

- 3.3 Electrical installation arrangement and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of arranging electrical installations circuits, control and protection.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG063A Electrical installations — arrangement, control and protection

Evidence shall show an understanding of circuit arrangements, control and protection of electrical installations that comply with the Wiring Rules and Service Rules to an extent indicated by the following aspects:

T1 Safety principles to which electrical systems in building and premises shall comply.

- Safety principles are given in Part1 (Section 1) of the Wiring Rules AS/NZS 3000 with deemed-to-comply requirements given in Sections 2 to 8.
- Compliant methods for providing protection - include those for providing protection against direct and indirect contact; thermal effects; unwanted voltages; overcurrent; fault currents; overload; overvoltage; injury from mechanical movement.
- Requirements for installation design and selection of equipment - includes compliant protection arrangements; correct functioning; compatibility with supply; estimation of maximum demands; voltage drop considerations; arrangement of circuits and the like

T2 Circuit and control arrangements encompassing:

- reason for dividing electrical installations into circuits
- factors that shall be considered in determining the number and type of circuits required for an installation.
- daily and seasonal demand for lighting power, heating and other loads in a given installation.
- number and types of circuits required for a particular installation.
- diagrams/schedules of circuits for given installations.
- application and arrangements of SELV and PELV circuits
- application and arrangement of an isolated supply

T3 Hazards and risks in an electrical installation encompassing:

- effects on the human body of various levels of a.c. and d.c. current and duration of current flow for various current paths.

REQUIRED SKILLS AND KNOWLEDGE

- risk of ignition of flammable materials due the thermal effects of current or electric arcs in normal service of an electrical installation.
- risk of injury from mechanical movement of electrically actuated equipment.
- Protection against direct contact (basic protection)
- acceptable methods
- use of extra-low voltage

T4 Protection against indirect contact encompassing:

- indirect contact with live parts of an electrical installation may occur.
- methods and devices that comply with the Wiring Rules for providing protection against indirect contact.
- components of the 'automatic disconnection of supply' method of protection against indirect contact.
- the terms 'touch voltage' and 'touch current'.
- the current path when a short circuit fault to exposed conductive parts of an appliance occurs.
- protection against indirect contact is by the use of Class II equipment and by electrical separation.
- additional protection by use of Residual Current Devices (RCDs)
- protection against indirect contact by use of extra-low voltage and electrical separation.
- Protection requirements for damp situations.

T5 Earthing encompassing:

- the terms: earthed, earthed situation, earth electrode, equipotential bonding, multiple earthed neutral (MEN) system, protective earth-neutral (PEN) conductor, main earthing conductor, protective earthing (PE) conductor, functional earthing, MEN link.
- selection of minimum size-earthing conductor for a range of active conductor sizes and materials.
- parts of an earthing system and the purpose of each.
- typical arrangement for a MEN earthing system.
- arrangements of protective earthing conductors that comply with the Wiring Rules.
- requirements for equipotential bonding in a range of installation situations.
- Installation of a MEN earthing system for a single phase installation

T6 Protection against overload and short circuit current encompassing:

- overload current or fault currents in an electrical installation.
- equivalent circuit of an earth fault-loop
- level of fault current possible at a given point in an installation from the fault-loop impedance and data from the electricity distributor.
- methods and devices that comply with the Wiring Rules AS/NZS 3000 for providing protection against the damaging effects of overload and fault current

REQUIRED SKILLS AND KNOWLEDGE

- requirements for co-ordination between protective devices and conductors
- requirements for co-ordination of protection devices for discrimination and back-up protection.

T7 Devices for automatic disconnection of supply encompassing:

- operating principles of thermal/magnet circuit breakers.
- operating principles of common types of fuses.
- operating principles of residual current devices (RCD).
- time/current curves tripping characteristics of various types of circuit breakers that comply with the requirements of the Wiring Rules.
- time/current curves fusing characteristics of various types of fuses that comply with the requirements of the Wiring Rules.
- time/current curves tripping characteristics of various types of RCDs that comply with the requirements of the Wiring Rules.
- factors in a fault loop that will affect the impedance of the circuit.
- maximum impedance of an earth fault-loop to ensure operating of a protection device.
- selecting a fuse for fault current limiting protection.
- drawing switchboard wiring arrangements of 2-pole RCDs, 4-pole RCDs, combination RCD/MCBs.

T8 Protection against over voltage and under voltage encompassing:

- causes of over voltage and how this may affect the electrical system.
- methods for protection against over voltage.
- causes of under voltage and how this may affect the electrical system.
- methods for protection against under voltage.

T9 Control of an electrical installation and circuits encompassing:

- switch types, current and voltage ratings and IP rating and where these apply.
- switching requirements for isolation, emergency, mechanical maintenance and functional control.
- control arrangement for complete installations with and without safety services and an alternative supply.

T10 Switchboards / distribution boards encompassing:

- Purpose, types and applications.
- Physical and circuit arrangements for whole current and CT metering.
- Physical and circuit arrangements of main switches, circuit protection devices, fault-current limiters and metering equipment and other distributor equipment.
- compliance requirements (includes location and access, arc fault protection, identification, construction suitability, equipment marking, wiring, fire protection and arc-fault protection).

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required

9.2)

Before the critical aspects of evidence are considered all

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to demonstrate competency in this unit

prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - arranging electrical installations circuits, control and protection as described as described in 8) and including:
 - A Determining the extent and nature of the installation for job specifications
 - B Obtaining and understand the safety and other regulatory requirements to which the electrical installation shall comply
 - C Determining individual load requirements.
 - D Arranging and terminate circuits, control and protective devices to comply with all requirements
 - E Selecting circuit protective devices residual current

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device that comply with all requirements.

- F Selecting switchgear and control gear that meet current, voltage and IP ratings and functional requirements.
- G Obtaining evidence of compliance for the equipment selected
- H Documenting installation arrangement, specification for items selected and reasons for the selections made.
- I Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to arranging circuits, control and protection for general electrical installations.

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Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to arranging of circuits, control and protection for at least two general electrical installations comprising a main switchboard, supplying more than one circuit each for, lighting, socket outlets, and fixed appliances. One of the installations shall include a distribution board separate from the main switchboard and at least one circuit supplying a three-phase load and a fire pump.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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2.2) Literacy and numeracy skills

Competency Field 5)

Electrical

UEENEEG076A Install and replace low voltage current transformer metering

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the installation and/or replacement of low voltage CT metering for measurement of energy use by consumers under choice of supplier arrangement. It encompasses working safely and to installation and set up standards, evaluating the integrity of metering wiring and earthing systems, fixing metering, making power and communication connections, setting meter parameters and completing the necessary documentation.

Application of the Unit

Application of the Unit 4)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit require a license to practice in the workplace subject to regulations for undertaking of electrical work.

Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable, contracts of training such as apprenticeships.

Note.

Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage electrical installations is incorporated in unit UEENEEG105A and all prerequisite units it specifies

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Note: Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory meet the pre-requisite requirements of this unit.

UEENEEE101 Apply Occupational Health and Safety regulations, codes and practices in the workplace
A

UEENEEE102 Fabricate, dismantle, assemble of electrotechnology components
A

UEENEEE104 Solve problems in d.c circuits
A

Prerequisite Unit(s)	2)
	UEENEEE105 Fix and secure electrotechnology equipment A
	UEENEEE107 Use drawings, diagrams, schedules, standards, codes and specifications A
	UEENEEE137 Document and apply measures to control OHS risks associated with electrotechnology work A
	UEENEEG006 Solve problems in single and three phase low voltage machines A
	UEENEEG033 Solve problems in single and three phase electrical apparatus and circuits A
	UEENEEG063 Arrange circuits, control and protection for general electrical installations A
	UEENEEG101 Solve problems in electromagnetic devices and related circuits A
	UEENEEG102 Solve problems in low voltage a.c. circuit A
	UEENEEG103 Install low voltage wiring and accessories A
	UEENEEG104 Install appliances, switchgear and associated accessories for low voltage electrical installations A
	UEENEEG106 Terminate cables, cords and accessories for low voltage circuits A
	UEENEEG107 Select wiring systems and cables for low voltage general electrical installations A
	UEENEEG108 Trouble-shoot and repair faults in low voltage electrical apparatus and circuits A
	UEENEEG109 Develop and connect electrical control circuits A
	UEENEEG105 Verify compliance and functionality of low voltage general electrical installations A

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to install or replace CT energy metering.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented. (Note 1: Examples of hazards likely to be encountered are asbestos reinforced switchboard panels, deteriorating switchgear and cabling and location of the switchboard.)
	1.4 Switchboard on which the meter(s)/CTs is/are to be installed is inspected and evaluated for compliance with safety and functionality standards. (Note 2: Safety and

ELEMENT**PERFORMANCE CRITERIA**

- functionality standards include the clear identification of switchboard components and their function, sound electrical insulation of wiring and components, sound MEN and main earth connections, fire integrity and access.)
- 1.5 Approval to rectify safety and/or functionality defects of the switchboard is sought from person of higher authority in accordance with established procedures.
- 1.6 Installation of the meter and rectification work is prepared in consultation with others affected by the work and sequenced appropriately.
- 1.7 Material needed for the work is obtained in accordance with established procedures and checked against job requirements.
- 1.8 Tools, equipment and testing devices needed to for the work are obtained in accordance with established procedures and checked for correct operation and safety.
- 2 Install or replace CT metering.
- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Existing metering is checked as being isolated in strict accordance OHS requirements and procedures.
- 2.4 Approved rectification work is carried out to comply with standards and in accordance with established procedures.
- 2.5 Meters and CTs are installed/replaced to comply with technical standards and job specifications and requirements.
- 2.6 Metering power and communication connections (where necessary) are made in accordance with manufacturer's specifications and functional and regulatory requirements.
- 2.7 Meter operating parameters are set in accordance with manufacturer's specifications and functional and

ELEMENT	PERFORMANCE CRITERIA
	regulatory requirements.
	2.8 Unexpected situations are dealt with safely and with the approval of an authorised person
	2.9 Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures.
	2.10 Metering/CT installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.
3 Complete and report metering installation activities.	3.1 OHS work completion risk control measures and procedures are followed and supply is reinstated to the installation.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Final checks are made to that the installed metering and CTs conform to requirements.
	3.4 'As-installed' metering and CTs and rectification work is documented and appropriate persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and setting up interval metering.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG076A **Low voltage current transformer metering**

Evidence shall show an understanding of low voltage current transformer metering to an extent indicated by the following aspects:

T1 Current Transformers (CTs) encompassing:

- uses and functions
- AS60044.1-2007 requirements
- characteristics and saturation
- differences between metering and protection CTs
- standard ratios and outputs
- accurate range of loading
- thermal current limit
- burden and connecting cable length
- short circuiting secondary as a safety issue
- accuracy class

T2 Revenue meter types used with CTs encompassing:

T3 CT installations encompassing:

- uses in the regulated market and relevant regulations
- types and mounting methods
- switchboard layouts (various Distributors)
- minimum spacing of CTs
- connections to single and polyphase revenue meters
- consequence of polarity reversal in one phase of a polyphase meter

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview 9.1)

of

Assessment

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical 9.2)

aspects of

evidence

required to

demonstrat

e

competenc

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically.

Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines

EVIDENCE GUIDE

y in this unit

- UEE07'. Evidence shall also comprise:
- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
 - Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Install /replace low voltage CT metering as described in 8) and including:
 - A Inspecting and evaluating safety and functionality compliance of the switchboard accurately.
 - B Following established procedures to obtain approval to rectify non-compliance aspects of the switchboard.
 - C Carrying out preparation work effectively.
 - D Rectifying compliance defects.
 - E Placing and securing metering correctly.
 - F Making power and communications connections in accordance with manufacture's specifications and functional and regulatory requirements.
 - G Setting meter parameters in accordance with manufacture's specifications and functional and regulatory requirements.
 - H Reinstating supply to the installation safely.
 - I Documenting CT metering and rectification work and notifying appropriate persons in accordance with

EVIDENCE GUIDE

established procedures.

- J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in 'Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing and setting up interval metering.

Method of assessment 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with 9.5)

There are no concurrent assessment recommendations for this unit.

EVIDENCE GUIDE

other units

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the installation of at least a:

- low voltage CT installation using single phase meters
- low voltage CT installation using a polyphase meter
- metering installation where compliance rectification work is required

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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2.2) Literacy and numeracy skills

Competency Field 5)

Electrical

UEENEEG101A Solve problems in electromagnetic devices and related circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers determining correct operation of electromagnetic devices and related circuits and providing solutions as they apply to electrical installations and equipment. It encompasses working safely, power circuit problems solving processes, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in electromagnetic devices and related circuits.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE10 Apply Occupational Health and Safety
1A regulations, codes and practices in the
 workplace

UEENEEE10 Solve problems in d.c circuits
4A

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to work on electromagnetic devices and circuits.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	OHS risk control work preparation measures and procedures are followed.
	1.3	The nature of the device(s)/circuit(s) problem is obtained from documentation or from work supervisor

ELEMENT	PERFORMANCE CRITERIA
	to establish the scope of work to be undertaken.
	1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve electromagnetic devices/circuit problems.	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established methods are used to solving circuit problems from measure and calculated values as they apply to electromagnetic devices/circuits.
	2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to solve circuit problems is documented.
	3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in electromagnetic devices and related circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EG101A

Electromagnetic devices and circuits

Evidence shall show an understanding of electromagnetic devices and circuits to an extent indicated by the following aspects:

T1 Magnetism encompassing:

- magnetic field pattern of bar and horse-shoe magnets.
- magnets attraction and repulsion when brought in contact with each other.
- common magnetic and non-magnetic materials and groupings (diamagnetic, paramagnetic and ferromagnetic materials).
- principle of magnetic screening (shielding) and its applications.
- practical applications of magnets
- construction, operation and applications of reed switches.

T2 Electromagnetism encompassing:

- conventions representing direction of current flow in a conductor.
- magnetic field pattern around a single conductor and two adjacent conductors carrying current.
- Using the “right hand rule” to determine the direction of magnetic field around a current carrying conductor.
- direction of force between adjacent current carrying conductors.
- effect of current, length and distance apart on the force between conductors (including forces on bus bars during fault conditions).
- magnetic field around an electromagnet.
- Using the “right hand rule” to determine the direction of magnetic field around a current carrying coil.
- magnetomotive force (m.m.f.) and its relationship to the number of turns in a coil and the current flowing in the coil.
- practical applications of electromagnets.

T3 Magnetic circuits encompassing:

- magnetic characteristic curve for various materials and identify the various regions.
- Identify the various conditions of a magnetic material from its Hysteresis loop.

REQUIRED SKILLS AND KNOWLEDGE

- factors which determine losses in magnetic material.
- methods used to reduce electrical losses in a magnetic circuit.
- magnetic flux (definition, unit and symbol).
- reluctance as the opposition to the establishment of magnetic flux.
- permeability (definition, symbol and unit).
- difference for magnetic and non-magnetic materials in regards to reluctance and permeability.
- calculation of m.m.f., flux or reluctance given any two values.
- flux density (definition, symbol, unit and calculation).
- magnetising force (definition, symbol, unit and calculation).
- common magnetic circuit types.
- effect of an air gap in a magnetic circuit.
- terms “magnetic leakage” and “magnetic fringing”.

T4 Electromagnetic induction encompassing:

- principle of electromagnetic induction (Faraday’s law of electromagnetic induction).
- applying “Fleming’s right hand rule” to a current carrying conductor under the influence of a magnetic field.
- calculation of induced e.m.f. in a conductor given the conductor length, flux density and velocity of the conductor.
- calculation of induced e.m.f. in a coil given the number of turns in a coil and the rate of change of flux.
- calculation of force on a conductor given the flux density of the magnetic field, length of the conductor and the current being carried by the conductor.
- Lenz’s law
- applications of electromagnetic induction

T5 Inductance encompassing:

- construction of an inductor, including a bifilar winding inductor.
- Australian Standard circuit diagram symbol for the four types of inductor.
- effect of physical parameters on the inductance of an inductor.
- common types of inductor cores.
- applications of the different types of inductors.
- definition of terms self induction, inductance and mutual inductance.
- calculation of value of self induced e.m.f. in a coil.
- mutual induction occurs between two coils.
- graphical relationship between load voltage, current and self induced e.m.f. in a single d.c. circuit having inductance.
- practical applications for the effects of self and mutual induction.
- undesirable effects of self and mutual induction.
- definition of term “time constant” and draw the characteristic curve as applied to a series circuit containing an inductor and a resistor. (LR circuit) Calculation of value

REQUIRED SKILLS AND KNOWLEDGE

of the time constant for an LR circuit given the values of the components.

- time constants required for the current in an LR circuit to reach its final value.
- determining of instantaneous values of voltage and current in an LR circuit using a universal time constant chart.

T6 Measurement Instruments encompassing:

- moving coil, moving iron, dynamometer meter movements and clamp testers.
- practical applications for moving coil, moving iron and dynamometer meter movements.
- Calculation of resistance of shunts and multipliers to extend the range of ammeters and voltmeters.
- factors to be considered in selecting meters for a particular application.
- safety category of meters and their associated applications.
- steps and procedures for the safe use, care and storage of electrical instruments.

T7 Magnetic devices encompassing:

- construction, operation and applications of relays.
- construction, operation and applications of contactors.
- magnetic methods used to extinguish the arc between opening contacts.
- construction, operation and applications of Hall Effect devices.
- operation and applications of magnetostriction equipment.
- construction, operation and application of magnetic sensing devices.

T8 Machine principles encompassing:

- basic operating principle of a generator.
- applying Fleming's right hand rule for generators.
- basic operating principle of a motor.
- applying Fleming's left hand rule for motors.
- calculation of force and torque developed by a motor.

T9 Rotating machine construction, testing and maintenance encompassing:

- components of a d.c. machine.
- difference between a generator and a motor in terms of energy conversion.
- nameplate of a machine.
- using electrical equipment to make electrical measurements and comparison of readings with nameplate ratings.
- Identification of faults in a machine from electrical measurements.
- care and maintenance processes for rotating machines
- safety risks associated with using rotating machinery.

T10 Generators encompassing:

- basic operation of a d.c generator.
- calculation of generated and terminal voltage of a d.c. shunt generator

REQUIRED SKILLS AND KNOWLEDGE

- prime movers, energy sources and energy flow used to generate electricity.
- types of d.c. generators and their applications.
- methods of excitation used for d.c. generators.
- equivalent circuit for a d.c. generator.
- importance of residual magnetism for a self excited generator.
- open circuit characteristics of d.c. generators.
- load characteristics of a d.c. generator.
- reversing the polarity of a d.c. generator
- Connect and test a d.c. generator on no-load and load
- Identify safety risks associated with using generators.

T11 Motors encompassing:

- operation of a motor and its energy flow.
- effect of back e.m.f. in d.c. motors
- torque as the product of the force on the conductors and the radius of the armature/rotor.
- types of d.c. motors and their applications.
- circuit diagrams for the types of d.c. motors.
- equivalent circuit for the types of d.c. motors.
- calculation of power output of a motor.
- characteristics of the different types of d.c. motors.
- connection and testing a d.c. shunt motor on no-load and load
- reversing the direction of rotation of a d.c. motor.
- safety risks associated with using motors (include risks of series d.c. motors).

T12 Machine efficiency encompassing:

- losses that occur in a d.c. machine.
- methods used to determine the losses in a d.c. machine.
- calculation of losses and efficiency of a d.c. machine.
- efficiency characteristic of a d.c. machine and the conditions for maximum efficiency.
- application of Minimum Energy Performance standards (MEPS).
- methods used to maintain high efficiency.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

EVIDENCE GUIDE

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also

EVIDENCE GUIDE

comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Solve problems in electromagnetic circuits as described as described in 8) and including:
 - A Using methodological techniques to solve problems in circuits with an electromagnetic device from measure and calculated values
 - B Determining the operating parameters of an existing circuit with an electromagnetic device.
 - C Alternating an existing circuit with an electromagnetic device to comply with specified operating parameters.
 - D Developing circuits with electromagnetic devices to comply with a specified function and operating parameters.
 - E Dealing with unplanned events

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in electromagnetic devices and related circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving problems in electromagnetic devices and related circuits by:

- Determining the operating parameters of an existing circuits with electromagnetic devices
- Altering an existing circuit with an electromagnetic device to comply with specified operating parameters
- Developing circuit with an electromagnetic device to comply with a specified function and operating parameters

AND

In relation to the following on more than one occasions:

Solving problems

- Connecting circuits,
- Using methodological problem solving techniques,
- Solving electromagnetic device problems,
- Demonstrate an understanding of the behaviour of current and voltage in circuits with electromagnetic devices
- Calculating circuit parameters accurately,

Circuit and device testing

- Choose correct instruments and ranges for testing,
- Connect meters to measure parameters in circuits with electromagnetic devices,

and

At least four of the following electromagnetic devices

- Reed switches
- Solenoids
- Relays
- Contactors
- Inductive limit switches
- Bells

RANGE STATEMENT

- Lifting magnets
- Core balance devices
- Magnetic overloads
- Motors
- Generators
- Magnetic brakes
- Magnetic circuit breakers

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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2.2) Literacy and numeracy skills

Competency Field 5)

Electrical

UEENEEG102A Solve problems in low voltage a.c. circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers ascertaining correct operation of single and three phase a.c. circuits and solving circuit problems as they apply to servicing, fault finding, installation and compliance work functions. It encompasses safe working practices, multiphase circuit arrangements, issues related to protection, power factor and MEN systems and solutions to circuit problems derived from calculated and measured parameters.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE10 1A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE10 4A	Solve problems in d.c circuits
UEENEEG10 1A	Solve problems in electromagnetic devices and related circuits

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare to solve low voltage a.c. circuit problems.	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
		1.3	Safety hazards, which have not previously been identified, are noted and established risk control

ELEMENT	PERFORMANCE CRITERIA
	measures are implemented.
	1.4 The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.6 Sources of materials that may be required for the work are established in accordance with established procedures.
	1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve low voltage a.c. circuit problems.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
\	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established methods are used to solve circuit problems from measure and calculated values as they apply to single and three-phase low voltage circuit.
	2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to solve circuit problems is documented.

ELEMENT**PERFORMANCE CRITERIA**

- 3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and Solving single and three phase low voltage circuit problems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG102A Alternating current power circuits

Evidence shall show an understanding of alternating currents power circuits to an extent indicated by the following aspects:

T1 Alternating Current Quantities encompassing:

- sine, cosine and tangent ratios of a right angle triangle
- Pythagoras Theorem to a right angle triangle.
- use of the CRO to measure d.c. and a.c. voltage levels
- sinusoidal voltage generated by a single turn coil rotated in a uniform magnetic fields
- terms 'period', 'maximum value', 'peak-to-peak value', 'instantaneous value', 'average value', 'root-mean-square (r.m.s.) value', in relation to a sinusoidal waveform.
- calculation of the instantaneous value of induced voltage of a generated sinusoidal waveform.
- measurement of instantaneous, peak, peak-to-peak values and the period of a sinusoidal waveform.
- calculation of root-mean-square (r.m.s.) value and frequency of a sinusoidal waveform from values of peak voltage and period.

T2 Phasors Diagrams encompassing:

- purpose of phasor diagrams
- 'in-phase', 'out-of-phase', 'phase angle" lead' and 'lag'.
- phase angle between two or more alternating quantities from a given sinusoidal waveform diagram.
- convention for representing voltage, current and the reference quantity in a phasor diagram.
- drawing phasor diagrams to show the relationship between two or more a.c. values of voltage and/or current.
- determination of phase relationship between two or more sinusoidal waveforms from a given diagram and measurements.

T3 Single Element a.c. circuits encompassing:

- setting up and connect a single-source resistive a.c. circuit and take voltage and current

REQUIRED SKILLS AND KNOWLEDGE

measurements to determine the resistance

- determining the voltage, current resistances from measure of given values of any two of these qualities.
- relationship between voltage drops and current in resistive a.c. circuit
- applications of resistive a.c. circuits
- defining 'inductive reactance'.
- calculation of inductive reactance for a given inductor and the relationship between inductive reactance and frequency.
- applying Ohm's Law to determine voltage, current of inductive reactance in a purely inductive a.c. circuit given any two to these quantities.
- applications of inductive a.c. circuits.
- calculation of capacitive reactance
- applying Ohm's Law to determine voltage, current or capacitive reactance in a purely capacitive a.c. circuit given any two of the quantities.
- applications of capacitive a.c. circuits

T4 RC and RL Series a.c. circuits encompassing:

- impedance and impedance triangle.
- determining the impedance, current and voltages for a series RC circuit given the resistance, capacitance and supply voltage.
- drawing and labelling the impedance triangle for a series RC circuit
- drawing phasor diagrams for a series RC circuit
- AS/NZS 3000 requirements for the installation of capacitors.
- examples of capacitive components in power circuits and systems and the effect on the phase relationship between voltage and current.
- determining the impedance, current and voltages for a series RL circuit given the resistance, inductance and supply voltage.
- drawing and labelling the impedance triangle for a series RL circuit
- drawing the equivalent circuit of a practical inductor
- Draw phasor diagrams for a series RL circuit.
- examples of inductive components in power circuits and systems and describe their effect on the phase relationship between voltage and current

T5 RLC Series a.c. circuits encompassing:

- measuring component voltages in a series RLC circuit and using a phasor diagram to determine the supply voltage and phase angle between circuit voltage and circuit current.
- determining the impedance, current and voltages for a series RLC circuit given resistance, inductance, capacitance and supply voltage.
- drawing and labelling the impedance triangle for a series RLC circuit.
- calculation of total impedance for a series RLC circuit.
- calculation of voltage drop for cables using the values for reactance and a.c. resistance from AS/NZS 3008.

REQUIRED SKILLS AND KNOWLEDGE

- comparison of current limiting characteristics of inductors and resistors.
- practical examples of RLC series circuits

T6 Parallel a.c. Circuits encompassing:

- determining the branch currents of a parallel circuit that contain RL, RC or LC in two branches.
- using a phasor diagram to determine the total circuit current and phase angle in parallel RL, RC or LC circuits.
- determining the total circuit impedance of parallel RL, RC or LC circuits.
- measuring the branch currents in a parallel RLC circuit and use a phasor diagram to determine the total current and phase angle between circuit voltage and circuit current.
- determining the branch impedances, branch currents and phase angles voltages for a parallel RLC circuit given resistance, inductance, capacitance and supply voltage.
- calculation of impedance for a parallel RLC circuit.
- practical examples of parallel circuits.

T7 Power in an a.c. circuit encompassing:

- difference between true power, apparent power and reactive power and the units in which these quantities are measured.
- drawing the power triangle to show the relationships between true power, apparent power and reactive power
- defining the term "power factor" and phase angle.
- methods used to measure single phase power, energy and demand.

T8 Power Factor Improvement encompassing:

- effects of low power factor.
- requirements for power factor improvement.
- methods used to improve low power factor of an installation.
- local supply authority and AS/NZS 3000 wiring rules requirements regarding the power factor of an installation and power factor improvement equipment.
- methods used to measure single phase power factor.
- using manufacturers catalogues to select power factor equipment for a particular installation

T9 Harmonics and Resonance Effect in a.c. Systems encompassing:

- term "harmonic" in relation to the sinusoidal waveform of an a.c. power system.
- sources in a.c. systems that produce harmonics.
- problems that may arise in a.c. circuits as a result of harmonics and how these are overcome.
- methods and test equipment used to test for harmonics
- methods used to reduce harmonics in a.c. power system
- conditions in a series a.c. circuit that produce resonance.
- dangers of series resonance circuits

REQUIRED SKILLS AND KNOWLEDGE

- conditions in a parallel a.c. circuit that produce resonance.
- dangers of parallel resonance circuits
- AS/NZS3000 and the local supply authority requirements concerning harmonics and resonance effect in a.c. power systems.

T10 Three Phase Systems encompassing:

- features of a multiphase system.
- comparison of voltages generated by single and multiphase alternators.
- reasons for the adoption of three phases for power systems.
- how three phases is generated in a single alternator.
- Calculation of r.m.s. value of voltage generated in each phase given the maximum value.
- relationship between the phase voltages generated in a three phase alternator and the conventions for identifying each.
- term "phase sequence" (also, referred to as "phase rotation").
- determining the phase sequence of a three phase supply

T11 Three phase star-connections encompassing:

- connecting a three phase star-connection load.
- phase relationship between line and phase voltages and line and phase currents of a star-connected system.
- determining the r.m.s. value of line and phase voltage given any one of these quantities.
- determining the r.m.s. value of line and phase current given any one of these quantities.
- terms "balanced load" and "unbalanced load".
- effect of a reversed phase winding of a star connected alternator.
- example of balanced and unbalanced loads in typical power systems.

T12 Three phase four wire systems encompassing:

- purpose of the neutral conductor in a three phase four wire systems.
- determining the effects of an high impedance in the neutral conductor of a three phase four wire system supplying an unbalanced load where MEN earthing is employed.
- determining the value and phase relationship of neutral current in an unbalanced three phase four wire systems given line currents and power factors.
- AS/NZS 3000 requirements regarding neutral conductors.
- AS/NZS 3008.1.1 method for determining voltage drop in unbalanced three phase circuits

T13 Three phase delta-connections and Interconnected systems encompassing:

- connecting three phase delta loads.
- phase relationship between line and phase voltages and line and phase currents of a delta-connected system.
- determining the r.m.s. value of line and phase voltage given any one of these quantities.
- determining the r.m.s. value of line and phase current given any one of these quantities.

REQUIRED SKILLS AND KNOWLEDGE

- limitations and uses of open delta connections
- effect of a reversed phase winding of a delta connected transformer
- example of loads in typical power systems.
- drawing the typical combinations of three phase interconnected systems using star-connections and a delta-connection.
- relationship between line and phase voltages and line and phase currents in the typical interconnected systems using star-connections and delta-connections.

T14 Energy and power requirements of a.c. systems encompassing:

- purposes for measuring power, energy, power factor and maximum demand of a.c. power systems and loads.
- difference between true power, apparent power and reactive power and the units in which these quantities are measured in a three phase system.
- drawing the power triangle to show the relationships between true power, apparent power and reactive power in a three phase system.
- methods used to measure three phase power , energy, power factor and demand.
- determining how the power factor of a three phase installation can be improved.
- using manufacturers catalogues to select measurement equipment for a particular installation

T15 Fault Loop Impedance encompassing:

- term fault loop impedance of a a.c. power system
- determining fault loop impedance using resistance and reactance values from AS/NZS 3008.1.1
- measuring fault loop impedance of typical circuits
- procedures for testing fault loop impedance

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that

EVIDENCE GUIDE

can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Solve problems in single and three phase circuits as described as described in 8) and including:
 - A Using methodological techniques to solve problems in circuits in a.c. circuits from measure and calculated values
 - B Determining the operating parameters of existing circuits
 - C Altering an existing circuit to comply with specified operating parameters.
 - D Developing circuits to comply with a specified function and operating parameters.
 - E Determining the cause of low power factor in an existing circuit.
 - F Determining conditions causing an existing circuit to be unsafe.
 - G Dealing with unplanned events

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving single and three phase low voltage circuit problems.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving problems in a.c. circuit by:

- Determining the operating parameters of existing circuits
- Altering an existing circuit to comply with specified operating parameters
- Developing circuits to comply with a specified function and operating parameters of voltage, current, impedance, power and power factor
- Determining the cause of low power factor in an existing circuit.
- Determining conditions causing an existing circuit to be unsafe includes electric shock hazard from indirect contact with conductive parts, insufficiently low impedance of a fault current path and inadequate fault protection.

In relation to the following on more than one occasions:

Single phase circuits

- Connecting single-phase circuits
- Choosing correct instruments
- Taking measurements correctly and accurately.

Three-phase circuits

- Connecting three-phase circuits
- Choosing correct instruments
- Taking measurements correctly and accurately.

AND

At least four of the following applications

- Series a.c. circuits
- Parallel a.c. circuits
- Series / parallel a.c. circuits
- Single phase motors / controls
- Three phase motors / controls
- Synchronous machines
- Transformers / Auxiliary components

RANGE STATEMENT

- Star connected circuits
- Delta connected circuits
- Star-Delta interconnected circuits
- Open Delta circuits

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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Custom Content Section

Competency Field 5)
 Electrical

UEENEEG103A Install low voltage wiring and accessories

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the installation in building and premises of wiring enclosures, cable support systems, cables and accessories and designed to operate at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely and to installation standards, routing cables to specified locations, terminating cables and connecting wiring at accessories and completing the necessary installation documentation.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE10 1A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE10 2A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE10 4A	Solve problems in d.c circuits
UEENEEE10 5A	Fix and secure electrotechnology equipment
UEENEEE10 7A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE13 7A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG00	Solve problems in single and three phase

Prerequisite Unit(s)	2)
	6A low voltage machines
	UEENEEG03 3A Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG06 3A Arrange circuits, control and protection for general electrical installations
	UEENEEG10 1A Solve problems in electromagnetic devices and related circuits
	UEENEEG10 2A Solve problems in low voltage a.c. circuit
	UEENEEG10 6A Terminate cables, cords and accessories for low voltage circuits
	UEENEEG10 7A Select wiring systems and cables for low voltage general electrical installations
	UEENEEG10 8A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG10 9A Develop and connect electrical control circuits

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical license.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to install wiring and accessories.	<p>1.1 OHS procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.</p> <p>1.4 Installation of wiring is prepared in consultation with other affected by the work and sequenced appropriately.</p> <p>1.5 The nature and location of the work is determined from documentation or other appropriate person to establish the scope of work to be undertaken.</p> <p>1.6 Cable routes are planned within the constraints of the building structure, significant and requirements.</p> <p>1.7 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.</p> <p>1.8 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct</p>

ELEMENT	PERFORMANCE CRITERIA
	operation and safety.
	1.9 Preparatory work is checked to ensure no damage has occurred and complies with requirements.
2 Install wiring and accessories.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Wiring and accessories are installed to comply with technical standards and job specifications and requirements with sufficient excess to affect terminations.
	2.5 Accessories are installed straight and square in the required locations and within acceptable tolerances.
	2.6 Cables and conductors are terminated at accessories in accordance with manufacture's specifications and regulatory requirements.
	2.7 Ongoing compliance and safety inspection of installed wiring systems and testing of installed circuits is undertaken.
	2.8 Defects revealed through on-going compliance and safety inspection and tests are rectified.
	2.9 Cable installation and termination is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.
	2.10 Unexpected situations are dealt with safely and with the approval of an authorised person.
3 Completion and report installation activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance

ELEMENT**PERFORMANCE CRITERIA**

with established procedures.

- 3.3 'As-installed' cables/wiring and accessories is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing wiring and accessories for low voltage circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry standards, technologies and practices.

KS01-EG103A

Installation of wiring systems

Evidence shall show an understanding of the installation of wiring systems that comply with standards to an extent indicated by the following aspects:

T1 Standards, codes and requirements applicable to the installation of wiring systems encompassing:

- Cables and methods of mechanical protection and support
- Protection against and from other services.
- Prohibited cable locations
- Building codes affecting the installation of cables in buildings, structures and premises (limitation on penetration of structural elements, maintenance of fire protection integrity, and wiring above suspected ceilings)
- Issues affecting electrical installations in heritage buildings and premises (limitation on penetration of structural and finished elements, accessing cable routes, types and colour of exposed accessories).

T2 Use of other installation standards called up by the Wiring Rules for special situations encompassing:

- standards that apply to Electromedical treatment areas.
- additional requirements for construction and demolition sites.
- Relocatable installations and their site supply
- additional requirements for caravan park.
- additional requirements for marinas and pleasure craft at low voltage.
- additional requirements for shows and carnivals.

T3 Hazardous areas encompassing:

- Conditions that apply in an areas that require them to be classified as a 'Hazardous area'.
- Responsibility for classifying a hazardous area
- Awareness of standards called up by the Wiring Rules for selection of equipment and installations in Hazardous areas. (AS/NZS 3000 requirements for hazardous areas).

T4 Requirement for the installation of cables and accessories in damp situations and

REQUIRED SKILLS AND KNOWLEDGE

ELV installations encompassing:

- restricted zones around baths, showers, fixed water containers, pools, sauna heaters and fountains/water features for given installations.
- selecting equipment suitable for installation in given damp situations.
- voltage range that defines extra-low voltage.
- 'Separated extra-low voltage (SELV) system' and a 'Protected extra-low voltage (PELV) system'.
- AS/NZS 3000 requirements for selecting extra-low voltage systems and devices for a range of installations and conditions.

T5 Aerial cabling encompassing:

- Describe the types of aerial cabling.
- State the AS/NZS 3000 and local supply authority requirements for aerial cabling.
- Termination of aerial cables in accordance with AS/NZS 3000 and local requirements.
- installation of consumers mains for connection via overhead consumers terminals in accordance with AS/NZS 3000 and local requirements.
- Testing of installed cables compliance with Australian Standards

T6 Underground cabling encompassing:

- Describe permissible underground cabling systems.
- Identify other underground services.
- State the AS/NZS 3000 and local supply authority requirements for underground cabling.
- List the advantages and disadvantages of underground wiring systems
- selection of underground consumers mains in accordance with AS/NZS 3000 and local requirements

T7 Techniques for installing cables and wiring systems encompassing:

- Typical cable routes through buildings, structures and premises.
- Application of wiring accessories
- Drawing-in, placing and fixing of cables
- Cable and conductor terminations
- Maintaining fire rating integrity.
- Inspecting and testing installed and terminated cables to ensure they comply with continuity and insulation resistance and are safe to connect to the supply.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with

EVIDENCE GUIDE

the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall

EVIDENCE GUIDE

be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Install wiring and accessories for low voltage circuits as described as described in 8) and including:
 - A Reading and interpreting drawings related to cable layouts, cable schedules and apparatus locations.
 - B Planning cable routes and obtaining installation materials.
 - C Sequencing the installation effectively with other affected by the work.
 - D Routing, placing and securing cables in compliance with requirements.
 - E Placing and securing accessories accurately.
 - F Maintaining fire integrity.
 - G Terminating cable and conductors to comply with requirements.

EVIDENCE GUIDE

- H Undertaking on-going compliance and safety inspection and testing of installed circuits.
- I Rectifying any defects revealed through on-going inspection and testing
- J Correctly documenting 'as-installed' cables/wiring and accessories.
- K Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing wiring and accessories for low voltage circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and

9.5)

For optimisation of training and assessment effort, competency

EVIDENCE GUIDE

relationship with other units development in this unit may be arranged concurrently with unit:

UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
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Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to at least three different types of cable enclosure/support systems in combination with four different cable types and circuits for five different purposes as listed below.

Wiring systems enclosures and supports:

- Metallic conduit
- Non-metallic conduit
- Trunking
- Duct
- Cable tray/ladder
- Catenary
- Posts/poles/struts

Cable types:

- Thermoplastic insulated cable (TPI)
- Flat thermoplastic sheathed (TPS)
- Circular thermoplastic sheathed (TPS)
- Steel wire armoured (SWA)
- Fire rated cable (HT or HF or MIMS)
- Flexible cables
- Aerial cable

Circuit purpose:

- Consumers mains
- Submains
- Alternative supply
- Lighting;
- Socket outlets
- Single phase fixed appliance
- Single phase motor
- Three phase motor
- Control

RANGE STATEMENT

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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2.2) Literacy and numeracy skills

Competency Field	5)
	Electrical

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the installation of appliances protection devices, switchgear, controlgear, switchboards, and accessories designed to operate at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely and to installation standards, matching appliances and accessories with that specified, making required circuit connections and completing the necessary installation documentation.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Prerequisite Unit(s)	2)	
	UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work
	UEENEEG006A	Solve problems in single and three phase low voltage machines
	UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
	UEENEEG063A	Arrange circuits, control and protection for general electrical installations
	UEENEEG101A	Solve problems in electromagnetic devices and related circuits
	UEENEEG102A	Solve problems in low voltage a.c. circuit
	UEENEEG103A	Install low voltage wiring and accessories
	UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
	UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations
	UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
	UEENEEG109A	Develop and connect electrical control circuits

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical license.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to install appliances, switchgear and associated accessories.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.

ELEMENT	PERFORMANCE CRITERIA
	1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
	1.4 Installation is prepared in consultation with others affected by the work and sequenced appropriately.
	1.5 The nature and location of the work is determined from documentation or appropriate person to establish the scope of work to be undertaken.
	1.6 Locations of appliances, switchgear and accessories is planned within the constraints of the building structure, significant and requirements.
	1.7 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
	1.8 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established procedures and checked for correct operation and safety.
	1.9 Preparatory work is checked to ensure no damage has occurred and complies with requirements.
2 Install appliances, switchgear and associated accessories.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Appliances, switchgear and accessories are installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance.
	2.5 Accessories are installed straight and square in the required locations and within acceptable tolerances.

ELEMENT	PERFORMANCE CRITERIA
	2.6 Wiring is terminated at appliances, switchgear and accessories in accordance with manufacture's specifications and functional and regulatory requirements.
	2.7 Ongoing compliance and safety inspections of the installed appliances, switchgear and accessories is undertaken.
	2.8 Defects revealed through on-going compliance and safety inspection are rectified.
	2.9 Installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.
	2.10 Unexpected situations are dealt with safely and with the approval of an authorised person.
3 Completion and report installation activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.4 'As-installed' appliances, switchgear and accessories is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing low voltage electrical appliance, switchgear and accessories.

All knowledge and skills detailed in this unit should be contextualised to current industry standards, technologies and practices

KS01-EG104A Installation of appliances, switchgear and accessories

Evidence shall show an understanding of the installation of appliances (current-using equipment) and accessories to an extent indicated by the following aspects:

T1 Installation standards, codes and requirements applicable to installing electrical equipment encompassing.

- Protection against thermal effects
- Connection of electrical equipment (appliances, switchgear and accessories include switchgear and controlgear, switchboards, socket-outlets, lighting equipment and accessories, lamps and luminaires, smoke and fire detectors, cooking appliances, appliances producing hot water or steam, room heaters, electric heating cables for floors and ceilings, space heating, duct heaters, electricity converters, motors, transformers, capacitors, and batteries).
- Required and permitted locations current-using equipment and accessories
- Control, switching and over current and RCD protection

T2 Terminal configuration for connection of phase, neutral and protective earthing conductors for each type of equipment.

T3 Building codes affecting the installation of current-using equipment and accessories in buildings, structures and premises encompassing:

- maintenance of fire protection integrity, requirements for emergency services (safety services) and the like.

T4 Issues affecting electrical installations in heritage buildings and premises encompassing:

- limitation on types and colour of exposed accessories.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required

9.2)

Before the critical aspects of evidence are considered all

EVIDENCE GUIDE

to demonstrate competency in this unit

prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Install low voltage electrical apparatus and associated equipment as described as described in 8) and including:
 - A Reading and interpreting drawings related to and apparatus locations and circuit connections.
 - B Planning installation of appliances, switchgear and accessories and obtaining installation materials.
 - C Sequencing the installation effectively with other affected by the work.
 - D Placing and securing appliances, switchgear and accessories accurately in their planned location and in compliance with standards.

EVIDENCE GUIDE

- E Maintaining fire integrity.
- F Terminating and connecting appliances, switchgear and accessories to comply with requirements.
- G Undertaking on-going compliance and safety inspections
- H Rectifying any defects revealed through on-going inspections
- H Correctly documenting 'as-installed' appliances, switchgear and accessories.
- I Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing low voltage electrical apparatus and associated equipment.

EVIDENCE GUIDE

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG103A Install low voltage wiring and accessories

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installation and connection of appliances, switchgear and associated accessories as follows:

Each of the following

- Installing and connecting main switches, protective devices and links on a main switchboard and preparing the switchboard for the installation of metering
- Installing and connecting a custom switchboard;
- Socket-outlets;
- Lighting equipment and accessories;
- Luminaires, and

At least four of the following

- Cooking appliances
- Smoke and fire detectors
- Water heaters and controls
- Three phase motor starter and control switches
- Fixed electric heating system (room heaters)
- Transformers
- Appliances producing hot water or steam
- Electric heating cables for floors and ceilings
- Trace heating
- Duct heaters
- Electricity converters
- Capacitors.
- Batteries.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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Custom Content Section

Competency Field	5)
	Electrical

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

Modification History

Release	Action	Core/Elective	Details	Points
3	Edit	N/A	Corrected text in Range Statement	

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers inspection and testing to verify whether an electrical installation is safe and complies with all requirements. It encompasses working safely, visual inspections and mandatory, optional and functional testing following verification procedures, identifying non-compliance defects and mandatory reporting requirements.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101 A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102 A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104 A	Solve problems in d.c circuits
UEENEEE105 A	Fix and secure electrotechnology equipment
UEENEEE107 A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE137 A	Document and apply measures to control OHS risks associated with electrotechnology work
UEENEEG006 A	Solve problems in single and three phase low voltage machines

Prerequisite Unit(s) 2)

UEENEEG033 A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063 A	Arrange circuits, control and protection for general electrical installations
UEENEEG101 A	Solve problems in electromagnetic devices and related circuits
UEENEEG102 A	Solve problems in low voltage a.c. circuit
UEENEEG103 A	Install low voltage wiring and accessories
UEENEEG104 A	Install appliances, switchgear and associated accessories for low voltage electrical installations
UEENEEG106 A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107 A	Select wiring systems and cables for low voltage general electrical installations
UEENEEG108 A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109 A	Develop and connect electrical control circuits

2.2) Conditions

- Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory meet the requirements of this unit and its pre-requisite requirements.
- A 'licensed electrician' applying for an 'electrical contractors licence' may be required to undertake this unit to demonstrate their currency with verification of compliance requirements. In this case they are deemed to have met the pre-requisites for this unit provided that:
 - they hold a current 'electricians licence' or its equivalent issued in an Australian State or Territory and
 - have recently been in permanent employment as a

licensed electrician sufficient to evidence current knowledge of applicable standards and regulations.

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

Work which requires an electrical licence includes work on and/or supervision of electrical installations at or above low voltage.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to inspect and test an electrical installation.	1.1	OHS measures for the site are identified, obtained and understood.
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed.

ELEMENT	PERFORMANCE CRITERIA
	1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
	1.4 Documentation or deemed to comply standard on which installation is based is reviewed and understood.
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
	1.6 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with established procedures and checked for correct operation and safety.
	1.7 Preparatory work is checked to ensure no damage has occurred and complies with requirements.
2 Visually inspect and conduct safety testing on the installation.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Wiring is checked for suitability for the environments in which they are installed and suitably protected from damage or overheating.
	2.5 Cable conductor sizes are confirmed as meeting current-carrying capacity requirements and voltage-drop and fault-loop impedance limitations.
	2.6 Protection methods and devices are validated as meeting co-ordination requirements for overload and short-circuit protection.
	2.7 Switchgear and control gear is validated as being appropriately rated and meeting functional requirements.

ELEMENT	PERFORMANCE CRITERIA
	2.8 Evidence that electrical equipment complies with safety requirements is cited.
	2.9 Earthing system components are checked that they are correctly located and conductors correctly sized.
	2.10 Marking on switchboards are checked for accuracy and clarity and comply with requirements.
	2.11 Mandatory tests are conducted to verify that: earthing conductor resistance is sufficiently low; insulation resistance is sufficiently high; all polarities are correct; and circuit connections are correct as per AS/NZS3000.
	2.12 Testing is conducted to verify that: fault-loop impedance is sufficiently low and residual current devices operates as intended as per AS/NZS3000.
3 Report inspection and test findings.	3.1 OHS risk control work completion measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Non-compliance defects are identified and reported in accordance with established procedures.
	3.4 Recommendations for rectifying defects are made in accordance with established procedures.
	3.5 Mandatory documentation is completed in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and verifying compliance and functionality of general electrical installations.

All knowledge and skills detailed in this unit should be contextualised to current industry standards, technologies and practices.

KS01-EG105A Electrical installations — verification and testing

Evidence shall show an understanding of electrical installations testing and verification to an extent indicated by the following aspects:

T1 Electrical safety encompassing:

- Safety procedures for working on electrical systems, circuits and apparatus.
- Safe working practices as a normal part of carrying out electrical installation work
- Isolation and lockout procedures
- Tools and equipment needed to conduct electrical installation compliance inspection and testing.

T2 Legislated regulations encompassing:

- legislation and regulations that require installations and equipment to be inspected and tested to ensure they are safe.
- the person/bodies responsible for the various aspects of ensuring electrical installations are safe.
- results of tests that show an electrical installation is safe for connection to the supply.
- results of periodic inspection and tests that show construction site wiring and equipment is safe to use.
- results of periodic inspection and tests that show electrical equipment are safe to use.

T3 Visual inspection of installations for compliance with the Wiring Rules encompassing:

- Protection requirements
- General condition
- Consumers mains/submains
- Switchboards
- Wiring systems
- Equipment and accessories
- Earthing

T4 Testing installations encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- tests to ensure: insulation resistance is adequate; earth continuity is such that it will ensure the operation of protection devices under earth fault conditions; polarity of active/s and neutral for mains, submains and final subcircuits is correct; there is no transposition of earthing and neutral conductors; fault-loop impedance is sufficiently low; RCD for correct operation and sensitivity.
- functional tests to ensure active/s and neutral for the same circuit are clearly identified with their circuit protection device.
- tests that show all circuits and devices operate as intended.
- tests to determine the fault level at a particular point in an installation.

T5 Documentation encompassing:

- results of tests conducted on an installation to comply with requirements and ensure the installation is safe.
- documents of the results of testing an installation as required by the local supply authority.
- documents of periodic inspection and testing of construction site wiring and equipment in accordance with requirement.
- documents of periodic testing and inspection of electrical equipment including tagging requirements.

KS02-EG105A Electrical installations and equipment — principles and requirements

Evidence shall show an understanding of electrical installations and equipment principles and requirements to an extent indicated by the following aspects:

T1 Effects of electric current encompassing:

- Physiological effects of current.
- Basic principles by which an electric current can produce heat, light, motion and a chemical reaction.

T2 Single path practical circuit encompassing:

- Arrangement of energy source, protection device, switch and load in a circuit.
- The purpose of each component in the circuit.
- Consequences of an open-circuits, closed-circuits and short-circuits.

T3 Single-source multiple-path d.c. circuits encompassing:

- Circuit configurations and connection.
- Relationship between the parameters of voltage, current, resistance and power dissipation in the whole or any part of the circuit.
- Safely measuring the parameters for the whole or any part of the circuit.
- Methods of determining circuit behaviour for variation in any of the parameters from measured and calculated values.

T4 Alternating voltage and current generation, phase relationships, energy in an a.c. circuit encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Sinusoidal voltage generation and resulting current.
- The terms period; maximum value; peak-to-peak value; instantaneous value; average value; root-mean-square (r.m.s.) value; and frequency.
- Three-phases generation.
- Relationship between the phase voltages generated in a three-phase alternator and the conventions for identifying each.
- Method of determining the phase sequence or phase rotation of a three-phase supply.
- Methods of determining power and energy supplied by three phase circuits.

T5 Fundamental safety principles of the AS/NZS 3000 Part 1 (Section 1) and deemed to comply solution given in Part 2 encompassing:

- Definition of terms
- Fundamental safety principles of protection against direct and indirect contact with live parts; thermal effects; overcurrent; earth faults; abnormal voltages; spread of fire; mechanical injury and external influences.
- Fundamental principles of installation design; selection and installation of equipment; means of compliance (including alterations, additions and repairs) and verification of compliance.

T6 Electric motor selection, starting method and overload protection encompassing:

- Types of motor enclosures suitable for given environmental conditions
- Criteria for selecting motor starters and overload protection.
- Types and connection arrangements for direct-on-line and reduced voltage starters.
- Thermal, magnetic and thermistor overload protection methods.

T7 Ability to apply AS/NZ 3000 requirements for protective and functional earthing encompassing:

- Purpose of protective and functional earthing.
- Parts of the protective earthing systems.
- Earthing arrangements, earthing of equipment and equipotential bonding.
- Methods of determining the maximum fault loop impedance for a circuit.
- Selection of protective conductor and active conductor sizes for each circuit to ensure earth-fault loop impedance is sufficiently low to operate the circuit protective device.

T8 MEN system and its application encompassing:

- The roles of the protective earthing (PE) and neutral (N) conductors in an a consumer's installation and their relationship to the protective earth neutral (PEN) conductor in the electricity distributor's system or sub-main to an outbuilding.
- The importance of the MEN link when a fault occurs.
- The likely consequences of the absence of the MEN link or high impedance in the PEN conductor when a fault occurs.
- The requirements for installation of an MEN link in an installation and an outbuilding.

REQUIRED SKILLS AND KNOWLEDGE

T9 Knowledge of the application of transformers encompassing:

- Transformers used in distribution and transmission systems and large consumer installations.
- Transformers used in welding machines.
- Applications in appliances
- Risks and safety control measures associated with connection and disconnection of instrument transformers
- Safe working procedures when connecting and testing transformers.
- AS/NZS 3000 requirements and restriction on the installation and use of transformers.

T10 Ability to apply AS/NZ 3000 requirements for protection of circuit against overcurrent and abnormal voltages encompassing:

- Minimum fault levels specified by electricity distributors
- Methods and arrangement for protection against short-circuit currents and overload currents.
- Coordination of overload and short-circuit protection devices.
- Coordination between conductors and overload protection devices.
- Causes of over and undervoltage.
- Device and requirements for protection against over and undervoltage.

T11 Additional protection by use of RCDs and use of extra-low voltage for basic and fault protection encompassing:

- Limitation of an RCD to protect against contact with live parts
- AS/NZS 3000 requirements for use of RCDs.
- Conditions for use of extra-low voltage to provide for basic and fault protection
- AS/NZS 3000 requirements for installation of SELV and PELV systems

T12 Ability to select cables for single and three phase mains and sub-mains for single and multiple installations that comply with requirements of AS/NZS 3000 and AS/NZS 3008.1 encompassing:

- Methods of determining maximum demand.
- Types of cables available.
- Installation methods and external influences effecting cable current-carrying capacity
- Voltage drop limitation
- Short-circuit performance consideration.

T13 Ability to select cables for final sub-circuits that comply with requirements of AS/NZS 3000 and AS/NZS 3008.1 encompassing:

- Maximum demand of final sub-circuits.
- Types of cables available.
- Installation methods and external influences effecting cable current-carrying capacity
- Effect of earth-fault loop impedance and voltage drop limitations on circuit route

REQUIRED SKILLS AND KNOWLEDGE

length.

- Short-circuit performance considerations.

T14 Ability to apply AS/NZS 3000 requirements for control and protection of installations encompassing:

- Devices for functions of isolation; emergency; Mechanical maintenance and functional control.
- Method for assessing prospective short circuit current.
- Devices and arrangement for protection against overload and short-circuit current.
- Additional protection by RCD
- Protection against switchboard internal arc faults.

T15 Ability to apply AS/NZS 3000 requirements for the installation of electrical equipment in given damp situations encompassing:

- Limitation of installation of equipment in classified zones.
- Selection and location of equipment suitable for installation in given classified zones.
- Additional protection by RCD.
- Equipotential bonding in showers and bathrooms and swimming and spa pools.

T16 Ability to install, modify and test electrical equipment for construction and demolition sites, complying with AS/NZS 3012 and applicable workplace safety legislation encompassing:

- Supply and installation requirements.
- Protection of circuits.
- Initial and periodic inspection and testing
- Portable tool safety testing and tagging system in accordance with AS/NZS 3760.

T17 Knowledge of AS/NZS 3000 requirements for the installation of aerial conductors and underground wiring encompassing:

- Types and application of aerial conductors
- Aerial span limitations and required clearances
- Selection of aerial supporting poles/post and struts for a given application.
- Use and requirements of catenary support systems
- Acceptable cable types and protection for underground wiring categories.
- Underground wiring depth layer and protection
- Underground wiring clearances from other services

T18 Knowledge of AS/NZS 3000 requirements for electrical installations in hazardous areas encompassing:

- Types of areas classified as a hazardous area
- Standards to which the selection, installation and maintenance of electrical equipment shall comply.
- Additional training required to work competently with electrical equipment for hazardous areas

REQUIRED SKILLS AND KNOWLEDGE

- T19 Ability to verify compliance of an electrical installation in accordance with AS/NZS 3000 encompassing:
 - Visual inspection to determine whether the installation complies with requirements set out in Section 2 to 7 of AS/NZS 3000 and relevant specific installation standards.
 - Mandatory tests following guidance given in AS/NZS 3017

T20 Ability to perform effective safe isolation of any equipment encompassing:

- Preparation of a 'safe work method statement' (SWMS) or Job Safety Analysis (JSA) for effective safe isolation.
- Safe methods for identifying source of supply to be isolated.
- Switching-off, lock-out and tagging procedures.
- Safe methods for confirming effective and safe isolation

T21 Ability to apply AS/NZS 3000 requirements to install and terminate thermoplastic insulated cables; elastomer sheathed cables; XLPE sheathed cables; and high temperature cables; armoured cables; and neutral screened cables in a wide range of applications.

T22 Ability to perform the circuit tests required for electrical cables in a range of installations and final sub-circuit encompassing:

- Following safe testing procedures.
- Tests to show if the earth continuity and earth-fault loop impedance are sufficiently low.
- Testing to show if insulation resistance is sufficiently high.
- Testing to show if the polarity and circuit connections are correct.

T23 Ability to install final sub-circuit wiring into switchboards and connect to switchboard equipment in accordance with AS/NZS 3000 and electricity distributor's requirements.

T24 Ability to apply AS/NZS 3000 and electricity distributor's requirements for the installation and connect consumers mains encompassing:

- Installing of underground and overhead consumers mains
- Terminating consumers mains at pillars, pits mains connection boxes and consumers switchboard.
- Install unprotected consumers mains to reduce the risk of short-circuit current to a minimum.
- Installing bonding conductors where required.

T25 Ability to read, sketch and interpret electrical diagrams encompassing:

- Purpose and characteristics of schematic, block and wiring diagrams, plans and schedules.
- Conventions used in documenting electrical information
- Read and interpret schematic, block and wiring diagrams, plans and schedules
- Sketch electrical diagrams using conventional symbols

T26 Knowledge and understanding occupational safety and health encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Basics of Occupational Safety and Health regulations
- Legal responsibilities for employers and employees
- Employers' and employees' own "duty of care".
- Safety committees and their role

T27 Knowledge and understanding of the requirements for personal safety in the workplace encompassing:

- Purpose and use of Safe Work Method Statements (SWMS) or Job Safety Analysis (JSA).
- Purpose and process of reporting OHS incidents.
- Safety procedures for working with electrical circuits and equipment.
- Procedures for safe and effective isolation of electrical supply.
- Regulations for the supervision of apprentices and trainees.

T28 Process in rescuing a person in contact with live electrical conductors or equipment and the primary importance of the safety of the rescuer.

T29 Application of emergency first aid requirements for an electric shock victim encompassing:

- Calling for help.
- Applying cardiopulmonary resuscitation (CPR).
- Selection and use of fire extinguishers to control electrical fire at accident site.

T30 Dangers of high voltage equipment and distribution systems encompassing:

- Step and touch and induced voltages.
- Sources of induced voltage and stored energy
- Creepage and clearance requirements.
- Application of safe working procedures in the vicinity of HV equipment.

T31 Systematic method of commissioning and decommissioning electrical equipment and installations encompassing:

- Commissioning safety procedures
- Circuit voltage testing
- Phase rotation checks
- Functional testing
- Instrument and control parameter settings
- Decommissioning safety procedures.
- Identification of circuits with their control and protection devices.
- Impact of isolation on other parts of an installation.
- Tagging, testing and earthing.
- Safe removal of equipment.

T32 Diagnosing and rectifying faults in electrical apparatus and associated circuits encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Faults such as open-circuit; short-circuit; incorrect connections; insulation failure; unsafe condition; apparatus/component failure; related mechanical failure;
- Apparatus such as control devices; fixed appliances/accessories; lighting; electrical machines motors and controls; socket outlets, transformers; protection and metering devices.
- Circuits such as those supplying fixed appliances; lighting; socket outlets; motors and controls circuits; transformers; electronic or computer based equipment.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to

EVIDENCE GUIDE

be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Verify compliance and functionality of general electrical installations as described as described in 8) and including:
 - A Selecting correct tools and testing equipment.
 - B Identifying visual non-compliance defects.
 - C Using effective methods for conducting mandatory and optional tests.
 - D Identifying non-compliance from test results.
 - E Identifying causes of non-compliance.
 - F Completing mandatory reporting.
 - G Dealing with unplanned events

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to verifying compliance and functionality of general electrical installations.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to verifying compliance and functionality of at least two general electrical installations comprising a main switchboard, supplying more than one circuit each for, lighting, socket outlets, and fixed appliances. One of the installations shall include a distribution board separate from the main switchboard and at least one circuit supplying a three-phase load and a safety system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.3) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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2.3) Literacy and numeracy skills

Competency Field 5)

Electrical

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

Modification History

Release	Action	Core/Elective	Details	Points
3	Edit		In Pre-requisites, edit code to reflect correct unit title UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
3	Edit		In Pre-requisites, edit name to reflect correct unit title UEENEEE102A Fabricate, assemble and dismantle utilities industry components	

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the termination of cables and cords and their conductors at accessories and current-using devices designed to operate at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely and to standards, understanding wiring system and cable types and applications, selecting appropriate termination accessories, preparing and terminating cables and cords, terminating cables/cord conductors and ensuring completed termination complies with requirements.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101 A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102 A	Fabricate, assemble and dismantle utilities industry components
UEENEEE105 A	Fix and secure electrotechnology equipment
UEENEEE107 A	Use drawings, diagrams, schedules, standards, codes and specifications

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to terminate cables, cords and conductors	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Health and safety risks are identified and established risk control measures and procedures in preparation

ELEMENT	PERFORMANCE CRITERIA
	for the work are followed.
	1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
	1.4 The junction box/ terminal enclosures and terminal types are inspected to select the type and size of cable and conductor termination devices needed.
	1.5 Tools, materials and testing devices needed to for terminating cables and cords are obtained in accordance with established procedures and checked for correct operation and safety.
2 Terminate cables, cords and conductors	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.3 Cable/cord ends are cut and sheath/insulation stripped with sufficient length to prevent stain on terminations and without undue waste.
	2.4 Cable glands/retaining devices are fitted and secured to ensure cable/cord cannot be pulled out of entry into junction box/ terminal enclosure
	2.5 Conductors are prepared to suit the type of terminal at which there are to be connected.
	2.6 Conductors are terminated to ensure continuity across the terminal.
	2.7 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
	2.8 Unexpected situations are dealt with safely and with the approval of an authorised person.
3 Test terminated cables and cords	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Terminated cables are tested to ensure continuity

ELEMENT

PERFORMANCE CRITERIA

and insulation resistance comply with requirements.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and terminating cables, cords and accessories for low voltage circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EG106A

Wiring systems types, application and terminations

Evidence shall show an understanding of wiring systems types, application and terminations to an extent indicated by the following aspects:

T1 Cable types and terminations encompassing:

- cable variates (single cables, flexible cables, flexible cords, shielded cables, armoured cables, ribbon cables, other similar and like cables)
- structural components of cables and their purpose (conductor material, stranding, insulation type, voltage rating, screening, sheathing, armour and serving)
- Australian and International colour standards for cords and cables
- construction of common cables
- identification of cords and cables by conductor size, type and rating
- application of various cords and cables types
- identification of hardware used in terminating cords and cables
- preparation and termination of cords and cables
- termination of cords and cables using crimp lugs, tunnel connectors, soldering and solderless lugs
- requirements to protect and support cables adequately (protection against mechanical damage, protection from adverse temperatures and corrosion and protection from magnetic field that may affect the performance of the cable).

T2 Cords, cables and plugs encompassing:

- selection of flexible cords for given applications
- preparation of cord ends for connection
- fitting standard three pin plug tops to a flexible cords
- fitting standard three pin extension sockets to a flexible cords
- connecting variety of plugs to different flexible cord types
- requirements of AS/NZS 3000 for flexible cords, cables and plugs
- using test equipment to test and locate various faults in flexible cords and cables.

REQUIRED SKILLS AND KNOWLEDGE

T3 Flat TPS wiring systems encompassing:

- Australian Standards requirements for the termination and protection of flat TPS cable
- Installation of flat TPS cable in trunking and duct for the supply of socket outlets
- using flat TPS cable for lighting looms
- testing circuits to ensure they are safe and operate as intended

T4 Circular TPS wiring systems encompassing:

- Australian Standards requirements for the installation of circular TPS cable
- installation of circular TPS cables on cable ladder/tray
- installation of circular TPS cable
- testing circuits to ensure they are safe and operate as intended

T5 Thermoplastic insulated cables in non-metallic enclosures encompassing:

- Australian Standards requirements for the installation of non-metallic enclosures
- cutting and setting rigid non-metallic ducting, trunking and conduit and accessories
- installation of circuits using TPI cables in non-metallic enclosures
- testing circuits to ensure they are safe and operate as intended

T6 Thermoplastic insulated cables in metallic enclosures encompassing:

- Australian Standards requirements for the installation of metallic enclosures
- fitting metallic conduit to metallic trunking and accessories
- cutting, threading and setting metallic conduit
- installation of circuits using thermoplastic insulated cables in metallic conduit, ducting and trunking
- testing circuits to ensure they are safe and operate as intended

T7 Fire protection cabling and systems encompassing:

- Australian Standards requirements for the installation of fire protection cable and mineral insulated metal sheathed cables
- requirements when passing a wiring system through a fire rated wall or floor
- recognising different fire protection cable types including Pyrolex, Radox and MIMS
- termination of fire protection cable.
- installation of circuits using fire protection cable.
- testing circuits to ensure they are safe and operate as intended

T8 Steel wire armoured (SWA) cables encompassing:

- Australian Standards requirements for the installation of SWA cables
- identifying accessories used with SWA cables
- installation of circuits using SWA cables
- testing circuits to ensure they are safe and operate as intended

REQUIRED SKILLS AND KNOWLEDGE

T9 Trailing cables and catenary systems encompassing:

- Australian Standards requirements for the installation of trailing cables and catenary wiring
- identifying equipment used with trailing cable and catenary systems
- installation of catenary wiring systems
- installation of trailing cable systems supplying pendant sockets
- testing the installation to ensure it is safe and operates as intended

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material

EVIDENCE GUIDE

carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Install wiring and accessories for low voltage circuits as described as described in 8) and including:
 - A Selecting appropriate cable/cord and conductor devices
 - B Cutting cable ends and stripping sheath/insulation to a sufficient length
 - C Fitting and securing cable glands/retaining devices correctly
 - D Preparing and terminating conducts to suit the type of terminal at which there are to be connected.
 - E Testing completed cables to ensure compliant continuity and insulation resistance
 - F Dealing with unplanned events

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing wiring and accessories for low voltage circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by terminating at least five different types of cables each at a junction box and a device terminal enclosure.

Cable types with copper conductors:

- Thermoplastic insulated cable (TPI)
- Flat thermoplastic sheathed (TPS)
- Circular thermoplastic sheathed (TPS)
- Steel wire armoured (SWA)
- Mineral insulated metal sheathed (MIMS)
- Flexible cables
- Flexible cords
- Aluminium conductor/cable

AND

Terminate their conductors at each of the follow

Terminal types

- Tunnel terminal
- Stud terminal
- Screw terminal

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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Custom Content Section

Competency Field 5)

Electrical

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers selecting wiring systems and cables for electrical installations operating at voltages up to 1,000V a.c. or 1,500 V d.c. It encompass knowledge and application of wiring systems and cable types, selecting wiring system compatible with the installation conditions, selecting cables that comply with required current-carrying capacity and voltage drop and earth fault-loop impedance limitations, coordination between protective devices and conductors and documenting selection decisions

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101 A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102 A Fabricate, dismantle, assemble of electrotechnology components

UEENEEE104 A Solve problems in d.c circuits

UEENEEE105 A Fix and secure electrotechnology equipment

UEENEEE107 Use drawings, diagrams, schedules,

Prerequisite Unit(s)	2)	
	A	standards, codes and specifications
	UEENEEG006	Solve problems in single and three phase low voltage machines
	A	
	UEENEEG033	Solve problems in single and three phase electrical apparatus and circuits
	A	
	UEENEEG063	Arrange circuits, control and protection for general electrical installations
	A	
	UEENEEG101	Solve problems in electromagnetic devices and related circuits
	A	
	UEENEEG102	Solve problems in low voltage a.c. circuit
	A	
	UEENEEG106	Terminate cables, cords and accessories for low voltage circuits
	A	

Employability Skills Information

Employability Skills	3)	
		This unit contains Employability Skills
		The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit	4)	
		4.1) General Application
		This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.
		4.2) Importation
		RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to select wiring systems and cables for general electrical installations	1.1 The extent and nature of the electrical installation is determined from job specifications.
	1.2 Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood.
	1.3 Cable routes, the route lengths of cables and the conditions in which the wiring system is to operate is determined from job specifications or from consultation with appropriate persons.
2 Select wiring systems and cables for general electrical installations	2.1 Wiring systems are selected for suitability for the environments in which they are to operate.
	2.2 Cable conductor sizes are selected to meet current-carrying capacity requirements and voltage-drop and earth fault-loop impedance limitations.
	2.3 Circuit protective devices are selected to meet requirement for co-ordination with conductor current-carrying capacity.
	2.4 Earthing system components are selected to meet requirements of an MEN system.
	2.5 Evidence is obtained that electrical equipment selected complies with safety requirements.

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|-----------------------------------|-----|--|
| 3 | Document electrical installation. | 3.1 | Evidence is obtained from manufacturers/suppliers that electrical equipment selected complies with safety requirements. |
| | | 3.2 | Reasons for selections made, including calculations, are documented in accordance with established procedures. |
| | | 3.3 | Electrical installation arrangement and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s). |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of selecting wiring systems and cables for general electrical installations.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG107A

Electrical installation — cable selection and co-ordination

Evidence shall show an understanding of selecting cables and ensuring co-ordination between protection device and conductors in electrical installations that comply with the Wiring Rules, Selection of cables standards and Service Rules to an extent indicated by the following aspects:

T1 Performance requirements - design and safety encompassing:

- harmful effects against which the design of an electrical installation must provide protection.
- performance standards of a correctly functioning electrical installation.
- supply characteristics that shall be considered when designing an electrical installation.
- acceptable methods for determining the maximum demand in consumer's mains and sub-mains.
- AS/NZS 3000 requirements limiting voltage drop in an installation.
- reason for dividing electrical installations into circuits and the factors that shall determine their number and type.
- typical external factors that may damage an electrical installation and that shall be considered in the installation design.
- methods for protecting persons and livestock against direct and indirect contact with conductive parts and the typical application of each.
- acceptable methods of protection against the risks of ignition of flammable materials and injury by burns from the thermal effects of current, in normal service.
- likely sources of unwanted voltages and the methods for dealing with this potential hazard.
- acceptable methods for protecting persons and livestock against injury and property against damage from the effects of over current.
- requirement for protection against fault current.
- requirement for protection against the harmful effects of faults between live parts of circuits supplied at different voltages.
- need for protection against injury from mechanical movement and how this may be achieved.

REQUIRED SKILLS AND KNOWLEDGE

- features of 'fire rated construction' and how the integrity of the fire rating can be maintained in relation to electrical installation.

T2 Final subcircuit arrangements encompassing:

- factors that shall be considered in determining the number and type of circuits required for an installation.
- daily and seasonal demand for lighting, power, heating and other loads in a given installation.
- number and types of circuits required for a particular installation.
- current requirements for given final subcircuits.
- layout/schedule of circuits for given installations.

T3 Factors affecting the suitability of wiring systems encompassing:

- wiring systems typically used with various construction methods and particular environments.
- installation conditions that may affect the current-carrying capacity of cables.
- external influences that may affect the current-carrying capacity and/or may cause damage to the wiring system.
- AS/NZS 3000 requirements for selecting wiring systems for a range of circuits, installation conditions and construction methods into which the wiring system is to be installed. Note: Wiring systems include cable enclosures, underground wiring, aerial wiring, catenary support, emergency systems, busbar trunking and earth sheath return.

T4 Maximum demand on consumer's mains/submains encompassing:

- acceptable methods for determining the maximum demand on an installation's consumer's mains and submains.
- maximum demand for the consumer's mains for given installations up to 400 A per phase.
- maximum demand for given submains.

T5 Cable selection based on current carrying capacity requirements encompassing:

- installation conditions for a range of wiring systems and applications.
- external influences that require the use of a derating factor.
- AS/NZS 3000 requirements for coordination of cables and protection devices.
- AS/NZS 3008 used to select conductor size based on the maximum current requirement for a given installation condition including any applicable derating factors.

T6 Cable selection based on voltage drop requirements encompassing:

- AS/NZS 3000 requirements for maximum voltage drop in an installation.
- relevant tables in AS/NZS 3008 for unit values of voltage drop.
- calculation of the expected voltage drop in a given circuit.
- selecting cables to satisfy voltage drop requirements in addition to current carrying capacity requirements.

T7 Cable selection based on fault loop impedance requirements encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- AS/NZS 3000 requirements for maximum fault loop impedance in an installation.
- relevant tables in AS/NZS 3008 to determine cable impedances.
- calculation of the expected fault loop impedance for a given circuit arrangement.
- selecting cables to satisfy fault loop impedance requirements in addition to current carrying capacity requirements and voltage drop requirements.

T8 Selecting protection devices encompassing:

- acceptable methods of protection against indirect contact.
- AS/NZS 3000 requirements for selecting methods and devices to protect against indirect contact for a range of installation types and conditions.
- coordination between conductors and protection devices to ensure the protection of cables from over heating due to over current.
- possible injuries to persons and livestock from hazards due to a short circuit.
- AS/NZS 3000 requirements for selecting devices to protect against overload current for a range of circuits and loads.
- AS/NZS 3000 requirements for selecting devices to protect against short-circuit current for a range of installation conditions.

T9 Selecting devices for isolation and switching encompassing:

- requirements for the provision of the isolation of every circuit in an electrical installation.
- need for protection against mechanical movement of electrically activated equipment.
- AS/NZS 3000 requirements for selecting devices for isolation and switching for a range of installations and conditions.

T10 Switchboards encompassing:

- AS/NZS 3000 and local supply authority requirements for switchboards.
- tariff structures for the supply of electricity.
- equipment installed at the main switchboards with capacities up to 400 A per phase.
- layout of a main switchboard for an installation supplied with single phase single tariff whole current metering.
- layout of a main switchboard for an installation supplied with single phase multiple tariff whole current metering.
- layout of a main switchboard for an installation supplied with multiphase single tariff whole current metering.
- layout of a main switchboard for an installation supplied with multiphase multiple tariff whole current metering.
- layout of a main switchboard for a multiple tenancy installation with whole current metering.
- layout of a main switchboard, including metering, for an installation supplied with three phase CT metering.
- local supply authority requirements for connection of an electrical installation to the electrical supply system

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

EVIDENCE GUIDE

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Selecting wiring systems and cables for general electrical installations as described as in 8) and including:
 - A Determining the extent and nature of the installation for job specifications
 - B Obtaining and understand the safety and other regulatory requirements to which the electrical installation shall comply
 - C Determining cable routes, the route lengths of cables and the conditions in which the wiring system is to operate.

EVIDENCE GUIDE

- D Selecting wiring system suitable for the environment requirements.
- E Selecting cable conductors sizes in consideration to current-carrying capacity and voltage-drop / earth fault-loop limitation.
- F Ensuring co-ordination between circuit protective device and conductor current-carrying capacity.
- G Selecting compliant earthing system components
- H Documenting wiring systems and cables to be used, specification for items selected and reasons for the selections made.
- I Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to selecting and arranging equipment for general electrical installations.

EVIDENCE GUIDE

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEE063A

Arrange circuits, control and protection for general electrical installations

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to selecting and selecting wiring systems and cables for at least two general electrical installations comprising a main switchboard, supplying more than one circuit each for, lighting, socket outlets, and fixed appliances. One of the installations shall include a distribution board separate from the main switchboard and at least one circuit supplying a three-phase load and a fire pump.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5
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Custom Content Section

Competency Field	5)
	Electrical

UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers trouble-shooting and repairing faults in electrical apparatus and interconnecting circuits and equipment operating at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely, reading circuit diagrams, sketching diagrams from traced wiring, logically applying fault finding procedures, conducting repairs and completing the necessary service documentation.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three

Prerequisite Unit(s) 4)

phase electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical license.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to trouble-shoot and rectify faults.	1.1 The extent and nature of the electrical installation is determined from job specifications.
	1.2 Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood.
	1.3 OHS procedures for a given work area are identified, obtained and understood.
	1.4 OHS risk control measures and procedures in preparation for the work are followed.
	1.5 The likely extent of work to be undertaken is envisaged from fault/breakdown reports and/or discussions with appropriate person(s).
	1.6 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
2 Trouble-shoot and repair faults.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

ELEMENT	PERFORMANCE CRITERIA
	2.4 Safety hazards resulting from the fault or breakdown are documented and risk control measures devised and implemented in consultation with appropriate personnel.
	2.5 Trouble-shooting is approached methodically drawing on knowledge of electrical circuits and apparatus using measured and calculated values of circuit/apparatus parameters.
	2.6 Circuit/apparatus components are dismantled where necessary and parts stored to protect them against loss or damage.
	2.7 Faulty circuits/components are rechecked and their fault status and acquired.
	2.8 Materials/replacement parts required to rectify faults are sourced and obtained in accordance with established procedures.
	2.9 Effectiveness of the repair is tested in accordance with established procedures.
	2.10 Apparatus is reassembled, finally tested and prepared for return to service.
	2.11 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.12 Trouble-shooting and repair activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Completion and report trouble-shoot and repair activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work area is cleaned and made safe in accordance with established procedures.
	3.3 Written justification is made for repairs to apparatus.
	3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and trouble-shooting and repairing faults in electrical apparatus and circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG108A Electrical circuit and equipment faults and fault finding techniques

Evidence shall show an understanding of electrical circuit and equipment faults and fault finding techniques to an extent indicated by the following aspects:

T1 Troubleshooting concepts encompassing:

- need to understand the correct operation of a circuit or equipment, switching and control circuit arrangements.
- common faults with circuits and equipment including operator faults, incorrect connections, open-circuits, short-circuits, device faults (mechanical), supply faults.
- typical faults symptoms and their causes: operation of circuit protective device, appliance does not operate, single phase motor does not develop enough torque to drive the load, three phase motor does not develop enough torque to drive the load, motor overload trips
- factors to consider in clarifying the nature of a fault: initial fault report, confirmation of symptoms of the fault, comparison of symptoms with normal operation
- effect to cause reasoning — assumptions of possible causes
- methods for testing assumptions: visual inspection, component isolation, test equipment, sectional testing, split-half tests
- repairing the fault and the steps needed to ensure fault doesn't re-occur
- dealing with intermittent faults (typical causes of intermittent faults are vibration, shock, changes in temperature and electromagnetic interference).
- final testing and re commissioning

T2 Troubleshooting water heater and appliance circuits/equipment encompassing:

- circuit diagrams of common single phase and three phase hot water systems
- single phase and three phase element resistance values (determined from measurement and calculation from power and voltage ratings)
- testing single and three phase elements for correct insulation resistance and continuity
- element replacement techniques
- operation of thermostats, thermal cut-outs and pressure relief valves, flow switches and checking sacrificial anodes

REQUIRED SKILLS AND KNOWLEDGE

- locating faults in common single and three phase hot water systems
- repairing faulty water heating systems

T3 Troubleshooting electrical appliance circuits/equipment encompassing:

- circuit diagrams of common single phase and three phase appliances
- methods to determine the cause of an RCD operation
- identification of appliances that is causing an RCD to trip
- testing single and three phase appliances for correct insulation resistance and continuity
- operation of appliances controls
- locating faults in common single and three phase appliances
- repairing faulty appliances

T4 Troubleshooting lighting circuits encompassing:

- circuit and wiring diagrams of common lighting circuits including single light controlled by a single switch, multiple lights controlled by a single switch, two and three way switching using the loop at the light method and the loop at the switch method.
- causes of wiring faults from supplied symptoms and circuit and/or wiring diagrams
- causes of faults in ELV lighting devices, include transformer (iron core or electronic), voltage drop, heat, over-voltage, poor connections, incompatible dimmers
- diagrams of a basic fluorescent light circuit including lamp, ballast and starter
- locating faults in fluorescent light circuits
- operation of a range of lighting control including passive infra-red (PIR), dimmers, photo electric or day-light switches and time clocks
- locating faults in lighting control circuits

T5 Troubleshooting single phase motor and control circuits encompassing:

- circuit diagrams of split phase, capacitor start, capacitor start capacitor run, universal and shaded pole single phase motors
- causes of single phase motor faults from supplied symptoms and circuit diagrams
- causes of electrical faults in single phase motors, include open and partially open circuit winding, short and partially short circuit winding, open circuit rotor, burnt out winding, coil shorted to frame.
- reasons for a thermal overload trip and how often they are to be reset before investigating a cause
- internal mechanical faults and their consequences, include bearings, fans, bent shaft, locked rotor, blocked air vents, centrifugal switches, environmental factors
- faults on driven loads and couplings and their consequences, include slipping belts, poorly aligned coupling (shims), vibration, loads bearing failing, load stalling.
- locating faults in single phase motors and their controls

T6 Troubleshooting three phase induction motor encompassing:

- circuit diagrams of three phase induction motors
- causes of three phase motor faults from supplied symptoms and circuit diagrams
- causes of electrical faults in three phase motors, include open and partially open circuit

REQUIRED SKILLS AND KNOWLEDGE

phase winding, short and partially short circuit phase winding, open circuit rotor, burnt out phase winding, coil shorted to frame.

- reasons for a thermal overload trip and how often they are to be reset before investigating a cause
- internal mechanical faults and their consequences, include bearings, fans, bent shaft, locked rotor, blocked air vents, environmental factors.
- faults on driven loads and couplings and their consequences, include slipping belts, poorly aligned coupling (shims), vibration, loads bearing failing, load stalling.
- locating faults in three phase induction motors and their controls

T7 Troubleshooting electrical installations encompassing:

- circuit diagrams, wiring diagrams, cable schedules and specifications of electrical installations
- causes of electrical installation faults from supplied symptoms and circuit diagrams include open and partially open circuit wiring, short and partially short circuit wiring, low insulation resistance, incorrect polarity, transposition of conductors, RCD tripping.
- locating faults in electrical installations
- repairing faulty electrical installation circuits components and wiring.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and

EVIDENCE GUIDE

regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Find and repair faults in electrical apparatus and circuits as described as described in 8) and including:
 - A Envisaging the likely extent of the fault and the work from fault/breakdown reports and/or discussion to elicit information on the fault/breakdown with appropriate person(s).
 - B Using appropriate tools and resources, and methodical fault finding techniques.
 - C Locating and trouble-shooting faults efficiently.
 - D Conducting tests or measurements in strict accordance with OHS and electrical safe working requirements.
 - E Rectifying faults effectively.
 - F Reporting cause of the fault and justifying the repairs undertaken.
 - G Dealing with unplanned events

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to trouble-shooting and repairing faults in electrical apparatus and circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG109A	Develop and connect electrical control circuits t
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Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in trouble-shooting and repairing faults in electrical apparatus and circuits designed for voltages up to 1000 V a.c. or 1500 V d.c in at least:

Four of the following **equipment and associated circuit**

- Switchboards
- Protective devices
- Lighting
- Heating
- Socket outlets
- Control devices

and

Three of the following **machines and associated control circuits**

- Single phase motors
- Single phase motor controls
- Three phase motors
- Three phase motor controls
- Synchronous machines
- DC machines
- DC machines controls
- Transformers and auxiliary components

RANGE STATEMENT

Notes.

1. The different types of faults include; Open-circuit; Short-circuit; Incorrect connections; Insulation failure; Unsafe condition; Apparatus/component failure; Related mechanical failure; Other electrical apparatus and circuit faults
2. Examples of apparatus are Control devices; Fixed appliances/accessories; Lighting; Single phase motors and their controls; Socket outlets Three phase motors and their controls, synchronous machines and their controls, transformers and their controls, switchboards and/or distribution boards and their controls, protection and/or metering devices, a.c./d.c. machines and their controls other like equipment/accessories.
3. Examples of circuits include those supplying fixed appliances; lighting; single-phase motors; socket outlets; three phase motors and controls circuits; machines and transformers; electronic or computer based equipment other like equipment/accessories.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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Custom Content Section

Competency Field 5)

Electrical

UEENEEG109A Develop and connect electrical control circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers developing, connecting and functionally testing electrical power and control circuits that perform specific control functions. It encompasses working safely; developing schematic/ladder diagrams and converting them to wiring diagrams; selecting and connecting contactors and control devices to perform a specific function.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101 A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102 A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104 A	Solve problems in d.c circuits
UEENEEE105 A	Fix and secure electrotechnology equipment
UEENEEE107 A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG006 A	Solve problems in single and three phase low voltage machines
UEENEEG063 A	Arrange circuits, control and protection for general electrical installations

Prerequisite Unit(s) 2)

UEENEEG101 Solve problems in electromagnetic devices and related circuits
A

UEENEEG102 Solve problems in low voltage a.c. circuit
A

UEENEEG106 Terminate cables, cords and accessories for low voltage circuits
A

Employability Skills Information**Employability Skills** 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit 4)**4.1) General Application**

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical license.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Develop and prepare to connect electrical control circuits.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
	1.4 Control scenarios are determined from discussions with appropriate person(s) and documented in accordance with established procedures.
	1.5 Agreement for the control scenarios is sought from appropriate person(s) and documented in accordance with established procedures.
	1.6 Schematic arrangement of control circuits that complies with agreed scenarios is documented in accordance with established procedures.
	1.7 Materials needed to connect control circuits are obtained in accordance with established procedures and checked against job requirements.
	1.8 Tools, equipment and testing devices needed to connect control circuits are obtained in accordance with established procedures and checked for correct operation and safety.
	1.9 Preparatory work is checked to ensure no damage has occurred and complies with requirements.
2 Connect and test electrical control circuits.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

ELEMENT	PERFORMANCE CRITERIA
	2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Control circuit components are connected to comply with the agreed control scenario.
	2.5 Control circuit operation is tested for agreed functionality and in strict accordance with OHS requirements and established safety procedures.
	2.6 Non-compliant control functions are rectified to comply with the agreed control scenario.
	2.7 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.8 Control circuits are connected and tested efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practice.
3 Completion and document circuit development activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 'As-connected' control circuits are documented using standard drawing conventions and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing and connecting control circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG109A

Electrical control devices and circuits

Evidence shall show an understanding of electrical control devices and circuits to an extent indicated by the following aspects:

T1 Basic relay circuits encompassing:

- Identification of given circuit diagrams (schematic) symbols and explain the operation of the components represented
- labelling wires and terminal (numbering systems)
- control relay - operating principles, basic contact configurations and identification and common applications
- push button - switching configurations and common applications
- selecting pushbuttons/pilot lamps from manufacturer's catalogues for specific applications
- development of simple stop-start relay circuit that incorporates pilot lights and latching circuit.
- connection and testing of control circuits

T2 Relay circuits and drawing conventions encompassing:

- circuit diagram drawing conventions
- selecting relays from manufacturers' catalogue for specified applications
- circuit development of electrical control circuit in accordance with a written description (specification) and list the sequence of operation of the circuit
- connecting simple electrical control circuit from circuit diagrams
- applying safe working practices when testing an electrical control circuit

T3 Remote STOP-START control and electrical interlocking encompassing:

- operation of local and remote start-stop control of relays
- operation of an electrically interlocked relay circuit
- development of a relay circuit incorporating local and remote start and stop buttons and electrical interlocking.
- connecting electrical circuits with local and remote start-stop control and with electrical interlocking.

REQUIRED SKILLS AND KNOWLEDGE

- applying circuit checking and testing techniques to an electrical control circuit.

T4 Time delay relays encompassing:

- timers - operating principles, basic contact configurations and identification and common applications
- selecting timers for specified functions from manufactures' catalogues
- development of timer controlled circuits from a written description and list the sequence of circuit operation
- connecting a timer controlled circuit using a circuit diagram as a guide.
- timer circuit checking and testing procedures.

T5 Circuits using contactors encompassing:

- contactors - operating principles, basic contact configurations and identification and common applications
- thermal overloads - operating principles, basic contact configurations and identification and common applications
- circuit diagram symbols
- circuit development using a contactor
- using contactors for motor control.
- compliance requirements for devices for isolating circuits.

T6 Jogging and interlocking encompassing:

- purpose and application of jogging control of motors
- operation of motor control using start, stop and jog buttons
- purpose and application of electrical/mechanical interlocking
- developing a multiple motor starting circuit from a description of the circuit operation including jog and interlock functions.
- selecting circuit components using manufacturers' catalogues for appropriate duty ratings
- connecting and testing a multiple motor starting circuit which incorporates start, stop and jog control.

T7 Control devices encompassing:

- common control devices used in automatic control circuits: limit switches, proximity switches, photoelectric cells, pressure switches, float switches, light sensors and temperature sensors
- basic operating principles of common control devices
- advantages and disadvantages of common control devices
- applications for common control devices
- selecting control devices using manufacturers' catalogues for specified applications
- connection of control devices into control circuits

T8 Programmable relays encompassing:

- programmable relays - advantages over electromagnetic relay circuit control.

REQUIRED SKILLS AND KNOWLEDGE

- typical applications of programmable relays.
- block diagram representation and basic operating principles
- input and output parameters, listing, connections and output types.
- connecting input and output devices to a programmable relay using a diagram
- basic programming of ladder circuits consisting of inputs, outputs i.e. stop-start circuit
- using the monitoring facility of the programmable relay to verify each ladder circuit operation.
- programming timers and using the monitoring facility of the programmable relay to check the values of the timer
- external devices
- implications of programming normally closed field devices
- conversion of control circuits
- installation of programmable control relays
- common faults and their symptoms

T9 Three-phase induction motor starters encompassing:

- reasons for limiting the starting current of large motors.
- requirements of the wiring rules (AS/NZS 3000) and the local supply authority service rules, with regard to starting and control of induction motors.
- DOL starter operating principles, applications and circuits
- electronic (soft) starter operating principles, applications and circuits
- connecting a DOL motor starter and testing the operation of the power and control circuits
- installation of DOL and soft starters

T10 Three-phase induction motor starters- reduced voltage encompassing:

- star-delta starter operating principles and circuits
- primary resistance starter operating principles and circuits
- auto-transformer starter operating principles and circuits
- secondary resistance starter operating principles and circuits
- common applications for each starter type
- comparison of motor starters basic characteristics
- selecting the most suitable motor starter for a given situation
- connecting motor starter power and control circuits for correct operation
- measuring starting current and torque of selected motor starters
- installation of reduced voltage starters

T11 Three-phase induction motor reversal and braking encompassing:

- reversing operating principles and control circuits
- plug braking operating principles and circuits
- dynamic braking operating principles and circuits
- regenerative braking operating principles and circuits

REQUIRED SKILLS AND KNOWLEDGE

- eddy current brakes operating principles and circuits
- mechanical brakes operating principles and circuits
- comparison of the difference braking methods used.
- typical applications for each braking method.
- connecting a circuit with a braking feature to operate a three-phase motor.
- installation of motor braking control circuits

T12 Three-phase induction motor speed control encompassing:

- pole changing operating principles and circuits
- variable frequency drives operating principles and circuits
- slip-ring motors operating principles and circuits
- installation of motor speed controllers.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required

EVIDENCE GUIDE

and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Develop and connect control circuits as described as described in 8) and including:
 - A Determining control scenarios specifications.
 - B Developing schematic arrangement of control circuits that meets the required scenario as specified.
 - C Connecting control circuit to function as specified.
 - D Conducting safety and functional testing correctly
 - E Identifying and correcting non-compliant control functions.
 - F Documenting 'as-connected' control circuit.
 - G Dealing with unplanned events

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to development and connecting electrical control circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG108B	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
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Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing, connecting and safety and functional testing on more than one occasion of at least four of the following control circuits:

- Multiple light switching circuit
- Master control circuit
- Single stop-start circuit
- Multiple stop-start circuit
- Time controlled circuit
- Machine interlocked circuit
- Motor jogging circuit
- Machine safety circuit

and,

using at least five of the following devices

- Multi-way switches
- Switches with more than two positions and Off
- Push buttons
- Electromechanical relays
- Programmable relays
- Contactors
- Reversing contactors
- Three phase starters
- Reduced voltage starters

and

with at least two of the following transducers/sensors:

RANGE STATEMENT

- Timers
- Limit switches
- Proximity switches
- Photoelectric cells
- Pressure switches
- Float switches
- Light sensors
- Temperature sensors

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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2.2) Literacy and numeracy skills

Competency Field 5)

Electrical

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers determining correct operation of complex polyphase power circuits and providing solutions as they apply to electrical power engineering work functions. It encompasses working safely, problem solving procedures, including using electrical measuring devices, applying appropriate circuit theorems and providing solutions derived from measurements and calculations and justification for such solutions.

Application of the Unit

Application of the Unit 4)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE125 Provide engineering solutions for
A problems in complex multiple path
circuits

and

UEENEEG102 Solve problems in low voltage a.c.
A circuits

Employability Skills Information

Employability Skills

3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to provide engineering solutions to problems in complex polyphase power circuits.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	OHS risk control work preparation measures and procedures are followed.
	1.3	The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.5	Sources of materials that may be required for the work are established in accordance with established procedures.
	1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct

ELEMENT	PERFORMANCE CRITERIA
	operation and safety.
2 Provide engineering solutions to problems in complex polyphase power circuits.	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established methods are used for solving circuit problems from measure and calculated values as they apply to complex polyphase power circuits.
	2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document solutions for problem solving activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to solve circuit problems is documented.
	3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing solutions for problems in complex polyphase power circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG149A

Polyphase power circuit analysis

Evidence shall show an understanding of polyphase power circuit analysis to an extent indicated by the following aspects:

T1 Polyphase supply system encompassing:

- advantage of three phase system compared to single phase systems
- double subscript notation
- phase sequence
- 120 degree operator
- given circuit component parameters, solve practically based problems using:
- equivalent circuits of transformers, lines and loads.
- component values using rectangular and polar notation.
- current divider and potential divider rules using complex impedances.
- The “per unit” values of voltage, current, VA and impedance to a common VA base.

T2 Types of three phase system connections encompassing:

- supply to balanced star, 3 and 4 wire loads
- supply to delta connected loads
- effects of phase reversal
- representation of currents and voltages as complex phasors for 3 phase and 3 phase and neutral quantities.
- calculation the values of and draw labeled phasor diagrams, not to scale, to represent complex values of current and voltage for balanced and unbalanced loads for star and delta systems.
- calculation of values of P, Q and S for balanced and unbalanced systems.
- draw and label single phase diagrams to represent 1 phase of a complex 3 phase system.
- represent unbalanced voltages or currents as symmetrical components.
- Phase to phase currents
- Phase to neutral/earth currents.

T3 Balanced three phase loads encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- calculations of balanced loads connected in star
- calculations of balanced loads connected in delta
- calculation of steady state values of fault current for various configurations.
- evaluation of the symmetrical component impedances for the various distribution system components. Transformers (earthed neutral case). Generators (high impedance earth)
- calculation of fault currents using the per unit approach.
- calculation using the “worst case” values based on transformer impedance only (ie., a short circuit fault)
- estimation of peak values using accepted multipliers.
- effects of the d.c. component on the instantaneous magnitudes of fault currents in transformers and generators.

T4 Unbalanced three phase loads encompassing:

- Star – 4 wire systems
- Delta systems
- Star – 3 wire systems
- Star 4 wire with neutral impedance

T5 Power in three-phase circuits encompassing:

- summation of phase powers and power in balanced loads
- measurement of power in balanced loads – 2 Wattmeter methods

T6 Reactive three phase power encompassing:

- power triangle calculation
- measurement of VAR
- power factor correction

T7 Fault currents encompassing:

- symmetrical components
- positive, negative and zero sequence impedance
- fault current breaking and let-through energy capacities of circuit breakers, fuses
- importance of fault/arc impedance
- calculation of fault currents - phase-to-earth faults
- calculation of fault currents - phase-to-phase faults
- analysis of asymmetrical faults currents.

T8 Harmonics in three phase systems encompassing:

- presence of triple in harmonics in 3 phase systems
- effects of 3 phase harmonics for different star and delta connections.
- methods for reducing harmonics in three phase systems.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

EVIDENCE GUIDE

competency in this unit

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Solve problems in complex polyphase power circuits as described in 8) and including:
 - A Determining the operating parameters of existing circuit.
 - B Using established problem solving methods.
 - C Taking relevant measurements accurately.
 - D Interpreting measured values appropriately.
 - E Providing effective solutions to circuit problems from measurements and calculations.
 - F Giving written justification of solutions provided.
 - G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above

EVIDENCE GUIDE

listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to providing engineering solutions for solving problems in complex polyphase power circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to providing engineering solutions to complex polyphase power circuits as they apply to problems related to electrical power engineering diagnosis and development work functions in any of the following types of circuit problems:

- - Determining the operating parameters of an existing complex circuit
 - Altering an existing complex circuit to comply with specified operating parameters
 - Developing complex circuits to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

2.2) Literacy and numeracy skills

Competency Field 5)

Electrical

UEENEEG171A Install, set up and commission interval metering

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the installation, set up and commission of interval metering for measurement of energy use by consumers under choice of supplier arrangement. It encompasses working safely and to installation and set up standards, evaluating the integrity of metering wiring and earthing systems, fixing metering, making power and communication connections, setting meter parameters and completing the necessary documentation.

Application of the Unit

Application of the Unit

4)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 3 level or higher.

- license to practice in the workplace subject to regulations for undertaking of electrical work.

Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work

Application of the Unit 4)

environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Licensing/Regulatory Information**1.2) License to practice**

The skills and knowledge described in this unit require a license to practice in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites**Prerequisite Unit(s) 2)****2.1) Competencies**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components

UEENEEE104A Solve problems in d.c circuits

UEENEEE105A Fix and secure electrotechnology equipment

Prerequisite Unit(s) 2)

- UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications
- UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work
- UEENEEG006A Solve problems in single and three phase low voltage machines
- UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits
- UEENEEG063A Arrange circuits, control and protection for general electrical installations
- UEENEEG101A Solve problems in electromagnetic devices and related circuits
- UEENEEG102A Solve problems in low voltage a.c. circuit
- UEENEEG103A Install low voltage wiring and accessories
- UEENEEG106A Terminate cables, cords and accessories for low voltage circuits
- UEENEEG107A Select wiring systems and cables for low voltage general electrical installations
- UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
- UEENEEG109A Develop and connect electrical control circuits
- UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to install, set up and commission interval metering.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented. (Note 1.)
	1.4 Switchboard on which the meter is to be installed is inspected and evaluated for compliance with safety and functionality standards. (Note 2)
	1.5 Approval to rectify safety and/or functionality defects of the switchboard is sought from person of higher authority in accordance with established procedures.

ELEMENT	PERFORMANCE CRITERIA
	1.6 Installation of the meter and rectification work is prepared in consultation with other effected by the work and sequenced appropriately. (Note 3)
	1.7 Material needed for the work is obtained in accordance with established procedures and checked against job requirements.
	1.8 Tools, equipment and testing devices needed to for the work are obtained in accordance with established procedures and checked for correct operation and safety.
2 Install, set up and commission interval metering.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Existing metering is checked as being isolated in strict accordance OHS requirements and procedures.
	2.4 Approved rectification work is carried out to comply with standards and in accordance with established procedures.
	2.5 Metering is installed to comply with technical standards and job specifications and requirements.
	2.6 Metering power and communication connections are made in accordance with manufacture's specifications and functional and regulatory requirements.
	2.7 Meter operating parameters are set in accordance with manufacture's specifications and functional and regulatory requirements.
	2.8 Unexpected situations are dealt with safely and with the approval of an authorised person
	2.9 Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures.
	2.10 Metering installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.

ELEMENT	PERFORMANCE CRITERIA
3 Completion and report metering installation activities.	3.1 OHS work completion risk control measures and procedures are followed and supply is reinstated to the installation. 3.2 Work site is cleaned and made safe in accordance with established procedures. 3.3 Final checks are made to that the installed metering conforms to requirements. 3.4 'As-installed' metering and rectification work is documented and appropriate persons notified in accordance with established procedures.

Note.

1. Examples of hazards likely to be encountered are asbestos reinforced switchboard panels, deteriorating switchgear and cabling and location of the switchboard.
2. Safety and functionality standards include the clear identification of switchboard components and their function, sound electrical insulation of wiring and components, sound MEN and main earth connections, fire integrity and access.
3. Preparation includes arranging for the safe isolation of the installation, access to a telecommunications connection where two-way metering is to be installed and access to a transducer connection where gas metering is to be included.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing, setting up and commissioning of interval metering.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG171A

Interval metering

Evidence shall show an understanding of interval metering to an extent indicated by the following aspects:

- T1 Reasons for metering and the regulated market (Regulations)
- T2 Metering layouts and requirements
 - purpose, types and applications.
 - metering equipment.

REQUIRED SKILLS AND KNOWLEDGE

- varying arrangements for metering and meter layouts

T3 Interval metering concepts and installation

- Meter types
- Meter construction – block diagram
- Meter functions
- Importing and exporting energy
- Classes of meters
- Single and polyphase meters
- Purpose, types and applications.
- Installation and power connection arrangements.
- Communication methods and arrangements.
- Connections for gas metering.
- Procedures for setting meter parameters.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most

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effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

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- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Install and set up interval metering as described in 8) and including:
 - A Inspecting and evaluating safety and functionality compliance of the switchboard accurately.
 - B Following established procedures to obtain approval to rectify non-compliance aspects of the switchboard.
 - C Carrying out preparation work effectively.
 - D Rectifying compliance defects.
 - E Placing and securing metering correctly.
 - F Making power and communications connections in accordance with manufacture's specifications and functional and regulatory requirements.
 - G Setting meter parameters in accordance with manufacture's specifications and functional and regulatory requirements.
 - H Reinstating supply to the installation safely.
 - I Documenting metering and rectification work and notifying appropriate persons in accordance with established procedures.
 - J Dealing with unplanned events by drawing on essential

EVIDENCE GUIDE

knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in 'Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing and setting up interval metering.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the installation of at least:

- a single phase interval meter
- a two-way interval meter
- an interval meter where compliance rectification work is required

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4
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2.2) Literacy and numeracy skills

Competency Field 5)

Electrical

UEENEEH102A Repairs basic electronic apparatus faults by replacement of components

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit deals the replacement of electronic components, cabling and sub systems of electronic apparatus. It encompasses safe working practices, following written and oral instruction and procedures, basic testing and techniques, dismantling and assembling apparatus and disconnecting and reconnecting components.

Application of the Unit

Application of the Unit 2)

This unit may apply to persons entering work in electro technology and may be used in school based vocational programs.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

License to practice

3)

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE1 02A Fabricate, dismantle, assemble of utilities industry components

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to repair electronic apparatus.	1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
	1.2 Established OHS risk control measures and procedures are followed in preparation for the work.
	1.3 The nature of the repair is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
	1.5 Sources of materials that may be required for the work are established in accordance with established routines and procedures.
	1.6 Tools, apparatus and testing devices needed

ELEMENT	PERFORMANCE CRITERIA
	to carry out the work are obtained and checked for correct operation and safety.
2 Repair electronic apparatus.	2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits/apparatus are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Apparatus is dismantled in accordance with manufacturer's guide and supervisor's instructions.
	2.5 Component parts are tagged during the dismantling to help ensure correct and efficient reassembly and stored to protect them against loss or damage.
	2.6 Repairs are affected efficiently without damage to other components, apparatus or circuits.
	2.7 Apparatus is assembled in an appropriate sequence with all components parts placed, secured and connected in accordance with manufacturer's guide or industry practice.
	2.8 Procedures for referring non-routine events to immediate supervisor for directions are followed.
	2.9 Repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
3 Complete and report repair work activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Repaired apparatus is prepared and forwarded to appropriate person(s) for

ELEMENT

PERFORMANCE CRITERIA

testing.

- 3.3 Work area is cleaned and made safe in accordance with established procedures.
- 3.4 Work supervisor is notified of the completion of the repair work in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out basic repairs to electronic apparatus by replacement of components.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EH102A Component replacement to repair basic electronic apparatus faults

Evidence shall show an understanding of component replacement to repair basic electronic apparatus faults, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Electronic soldering equipment and techniques

- Workshop hazards and safety associated with soldering
- Quality concepts
- Electronic soldering equipment
- The soldering process
- Lead free solder

T2. Printed circuit board soldering techniques

- Electronic component mounting
- Solder rework of printed circuit boards.
- Faulty solder joints

T3. Soldering electronic cables

- Soldering multi-strand, ribbon and coaxial cables
- Effects and prevention of electrostatic discharge (ESD)

T4. Electronic component basics

- Types of components
- The physical features and primary characteristic of components
- Marking and codes on components
- Handling static sensitive components

T5. Electronic cable overview and coaxial cable

- Coaxial cables types and characteristics
- Coaxial cable termination

T6. Performance copper cables

- Twisted pair voice and data cables
- Insulation displacement (IDC) termination

REQUIRED SKILLS AND KNOWLEDGE

- Colour codes
- Terminating performance cables
- Harness wiring

T7. Electronic apparatus components

- Fault finding
- Testing
- Replacement

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package. .

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Carry out basic repairs to electronic apparatus by replacement of components as described in 8) and including:
 - A Following manufacturer service instructions for access to components.
 - B Removing at least three different types of components specified in the work instructions.
 - C Replacing components to manufacturer requirements.
 - D Terminating correctly electronic cables using solderless termination techniques
 - E De-soldering and soldering to a high reliability standard and without damage to components.
 - F Reassembling the apparatus correctly.
 - G Testing apparatus operation.
 - H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note: Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to carrying out basic repairs to electronic apparatus by replacement of components.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE10 Fabricate, dismantle, assemble of utilities industry
2A components

Range Statement

RANGE STATEMENT

10)This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to carrying out basic repairs electronic apparatus limited to replacement or repair of components, including sub systems in which the fault has been previously established.

At least two of the repairs shall require soldering and desoldering and at least two of the repairs shall require a cable to be correctly terminated using a solderless termination technique.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Electronics

UEENEEH112A Troubleshoot digital sub-systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers determining correct operation of digital sub-systems. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in digital components circuits.

Application of the Unit

Application of the Unit 2)

This competency standard unit is intended for development of competency in either entry-level employment based programs incorporated in approved contracts of training or other approved training programs. It may also be used to augment formally acquired competencies.

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit do not require a license to practice in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However other

License to practice**3)**

conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEH1 02A Repair basic electronic apparatus faults by replacement of components

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve competency in

this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

<p>6) Elements describe the essential outcomes of a competency standard unit</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.</p>
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
<p>1 Prepare to troubleshoot digital sub-systems.</p>	<p>1.1 OHS procedures for a given work area are obtained and understood.</p> <p>1.2 OHS risk control work preparation measures and procedures are followed.</p> <p>1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.</p> <p>1.4 Advice is sought from the work supervisor to</p>

ELEMENT	PERFORMANCE CRITERIA
2 Troubleshoot digital sub-systems.	ensure the work is co-ordinated effectively with others.
	1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
3 Complete work and document troubleshooting activities.	2.4 Fault finding is approached methodically drawing on knowledge of digital components using measured and calculated values of parameters.
	2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6 Fault finding activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
	3.1 OHS work completion risk control measures and procedures are followed.
3 Complete work and document troubleshooting activities.	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to troubleshooting problems is documented.
	3.4 Work completion is documented and an appropriate person or persons notified in

ELEMENT

PERFORMANCE CRITERIA

accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and troubleshooting digital subsystems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EH112A

Digital sub-system

Evidence shall show an understanding of digital sub-system troubleshooting, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Analogue and digital signals

- Comparison between analogue and digital signals
- Observing digital and analogue waveforms

T2. Numbering systems

- The binary number system
- The hexadecimal number system
- Binary addition and subtraction

T3. Numbering systems - conversions

- Conversion between numbering systems
- Binary Coded Decimal (BCD)
- Gray code
- The American Standard Code for Information Interchange (ASCII)
- Unicode

T4. Combinational logic circuits

- Precautions when handling electronic devices due to electrostatic discharge (ESD)
- Truth tables
- Basic operation and characteristics of logic gates
- Logic probes
- Verification of operation of logic circuits

T5. Digital displays

- Seven segment LED displays
- Drive requirements
- Current limiting
- Multiplexed displays
- Seven segment Decoders
- Liquid Crystal Displays (LCD)

REQUIRED SKILLS AND KNOWLEDGE

- Emerging display technologies
- Verification of seven segment display circuit
- Interfacing with logic circuits

T6. Digital subsystem building blocks

- Encoders and Decoders
- Multiplexers and Demultiplexers
- Timing diagrams
- Flip flops, Latches and registers
- Ripple counters
- MOD counters
- Synchronous counters Multi-vibrators
- Clocks
- Verification and operation (eg. PLDs, ICs)

T7. Digital fault finding

- General fault finding principles
- Common digital faults
- Digital test equipment
- Digital test equipment (eg. Logic probes, Digital Oscilloscopes, digital trainers)

T8. Logic families and specifications

- Input and output voltage characteristics
- Comparison of logic families
- Unit load
- Noise margin
- Interfacing different logic families
- Tri-state logic devices

Overview and applications of A/D converter and D/A converter

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package. .

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Troubleshoot digital subsystems as described in 8) and including:

A	Using methodical problem solving methods.
B	Taking measurements correctly and accurately.
C	Calculating parameters correctly and accurately.
D	Providing solution to digital component/circuit problems.

- E Providing written justification for the solutions to problems.
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes, vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Method of assessment 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential

knowledge and skills described in this unit.

The resources used for assessment should reflect current industry practices in relation to troubleshooting digital subsystems.

**Concurrent
assessment and
relationship with
other units** **9.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH 102A Repair basic electronic apparatus faults by replacement of components

UEENEEH 116A Find and repair microwave amplifier section faults of electronic apparatus

UEENEEH 139A Troubleshoot basic amplifier circuits

The critical aspects of occupational health and safety covered in unit UEENEEH101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to troubleshooting a digital subsystem with at least three types of basic digital components/circuits or functions.

The troubleshooting must be demonstrated on three types of faults.

Notes:

1. The range of faults may include: open/shorted signal lines, output loading, input-to-input connections and clock-related faults.

2. Troubleshooting may involve the alteration of an existing digital subsystem to comply with a specified function and operating parameters.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electronics

UEENEEH139A Troubleshoot basic amplifier circuits

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers determining correct operation of basic amplifier circuits. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in basic amplifier circuits.

Application of the Unit

Application of the Unit 2)

This competency standard unit is intended for development of competency in either entry-level employment based programs incorporated in approved contracts of training or other approved training programs. It may also be used to augment formally acquired competencies.

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 3 level or higher.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit do not require a license to practice in the workplace provided equipment is not connected to installation wiring at

License to practice**3)**

voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH1 Repair basic electronic apparatus faults by
02A replacement of components

AND

UEENEEH1 Troubleshoot resonance circuits in an
14A electronic apparatus

OR

UEENEEG1 Solve problems in low voltage a.c. circuits

Prerequisite Unit(s) 4)
02A

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to troubleshoot basic amplifiers.	1.1 OHS procedures for a given work area are obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4 Advice is sought from the work supervisor to ensure the work is co-ordinated effectively with others.
	1.5 Sources of materials that may be required for the work are established in accordance with established procedures.
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve basic amplifier circuit problems.	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Fault finding is approached methodically drawing on knowledge of basic amplifiers using measured and calculated values of parameters.
	2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6 Fault finding activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using

ELEMENT	PERFORMANCE CRITERIA
	sustainable energy practices.
3 Complete work and document problem solving activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to troubleshooting problems is documented.
	3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and troubleshooting basic amplifiers.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EH139A

Basic amplifier circuit troubleshooting

Evidence shall show an understanding of basic amplifier circuit troubleshooting, applying safe working practices and relevant Standards Codes and Regulations to an extent indicated by the following aspects:

T1. Introduction to Amplifiers

- Purpose of amplifiers
- Introduction to black box model of amplifier
- Decibels, engineering terms and formulae
- Measurement of gain and frequency response

T2. Amplifier Terminal Characteristics

- Amplifier types and transfer characteristics
- Ideal amplifier transfer characteristics

T3. Practical amplifiers

- Practical amplifier terminal characteristics
- Input and output resistance calculations based on voltage measurements

T4. Operational amplifiers - Introduction

- Advantages of operational amplifiers
- Schematic symbol
- Open loop configuration
- Input and output resistance
- Gain bandwidth product
- Open loop amplifier operation
- Comparator circuit
- Circuit verification of operational amplifier configured as a comparator

T5. Operational amplifiers – Inverting Amplifier

- The need for and effects of negative feedback
- Inverting operational amplifier circuit configuration
- Inverting operational amplifier gain calculations
- Summing inverting operational amplifier gain calculations
- Circuit verification of operational amplifier gain

REQUIRED SKILLS AND KNOWLEDGE

T6. Operational amplifiers – Non-inverting amplifier

- Non-inverting operational amplifier circuit configuration
- Non-inverting operational amplifier gain calculations
- Circuit verification of non inverting operational amplifier gain
- Voltage follower circuit configuration
- Voltage follower circuit gain
- Circuit verification of voltage follower

T7. Operational amplifiers – Differential Amplifier

- The differential amplifier
- Schematic circuit of differential amplifier using an operational amplifier
- Differential amplifier gain calculations
- Circuit verification of differential amplifier operation
- The Schmitt trigger
- Circuit verification of Schmitt trigger circuit

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package. .

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside

the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement

- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Troubleshoot basic amplifiers as described in 8) and including:

- A Using methodical problem solving methods.
- B Taking measurements correctly and accurately.
- C Calculating parameters correctly and accurately.
- D Providing solution to amplifier circuit problems.
- E Providing written justification for the solutions to problems.
- F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to troubleshooting basic amplifiers.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to troubleshooting amplifiers for at least three types of amplifier configurations.

The troubleshooting must be demonstrated on three types of faults.

Note:

1. The range of faults may include: distortion, excessive power consumption, low gain and limited frequency responses.
2. Troubleshooting may involve the modification of an existing amplifier configuration to comply with a specified function and operating parameters.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Electronics

UEENEEI155A Develop structured programs to control external devices

Modification History

		UEENEEI155A	Develop structured programs to control external devices	
Release	Action	Core/Elective	Details	Points
2	Editorial	N/A	In Pre-requisites, delete “For the full prerequisite chain details for this unit please refer to Table 2 in Volume 1, Part 2”.	
2	Editorial	N/A	In Required Skills and Knowledge, insert topic numbering.	
2	Editorial	N/A	Replace “essential knowledge and associated skills” with “required skills and knowledge”.	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This competency standard unit covers programming of microprocessor/microcontroller devices to access external devices. The unit encompasses working safely, applying knowledge of control applications, and analogue and digital input/output signals, programming fundamentals, writing and testing program and documenting programming activities.

Application of the Unit

Application of the Unit 2)

This competency standard unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships and the like.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading	5	Writing	5	Numeracy	5
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Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare to develop structured programs for control sub systems.	1.1	OHS processes and procedures for a given work area are obtained and understood.
		1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
		1.3	The extent of structure programming to be developed is determined from job performance specifications and in consultations with relevant persons.
		1.4	Activities are planned to meet scheduled timelines in consultation with others involved on the work.
		1.5	Appropriate development kit and software are selected based on specified requirements and performance standard.
		1.6	Strategies are implemented to ensure programming is carried out efficiently.

ELEMENT	PERFORMANCE CRITERIA
2 Develop structured programs for control sub systems.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Knowledge of computer functions and features are applied to developing structure program.
	2.3 Correct structure and syntax is applied to developing structure program.
	2.4 Key features of the programming language are applied to develop and test solutions. (Note)
	2.5 Approaches to issues/problems are analysed to provide most effective solutions.
	2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards
3 Test and document structured program for control subsystems.	3.1 Testing procedures are developed to test developed program.
	3.2 Problems and bugs in program are rectified to ensure specification the creation of the code is met.
	3.3 Intermediate and final work reports are written in accordance with professional standards and presented to appropriate person or persons.

Note:

Although programming in 'C' is preferred any other structured language in current use by industry may be used.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the required skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing structured programs to control external devices.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EI155A Control programming fundamentals

Evidence shall show an understanding of control programming fundamentals to an extent indicated by the following aspects:

T1. Control applications of software

T2. Software terminology

T3. Programming languages currently used by industry

T4. Program development - flowcharts, pseudocode, algorithms

T5. Programming concepts encompassing:

- programming structure
- documentation
- compiling source code
- generating executable files
- scalar and structured data types
- constants and variables
- reading from keyboard and writing to screen
- arithmetic, relational and logical operations
- making decisions
- looping operations
- programming to access external devices via I/O boards
- functions - macros;
- global and local variables, auto and static variables;
- Intrinsic functions used in control;
- Writing functions;
- Linking in external functions to control hardware
- numerical and character arrays

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UEE11”. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the required knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures; and
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - developing structured programs to control external devices as described in 8) and including:
 - A Using key features of an appropriate programming language.
 - B Developing testing procedures.
 - C Identifying problem and bugs in program.

- D Rectifying problem and bugs in program.
- E Writing and presenting relevant documentation to an acceptable standard.
- F Dealing with unplanned events by drawing on required knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this competency standard unit.

Resources required to assess this unit are listed above in context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to developing structured programs to control external devices.

**Method of
assessment****9.4)**

This competency standard unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the required knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units****9.5)**

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to developing structured programs to control external devices for a given representative range of programs and control devices with the following attributes:

- safe working practices
- control applications knowledge application
- analogue and digital input/output signals
- programming
- program writing and testing
- programming activities documentation

Generic terms are used throughout this Vocational Standard shall be regarded as part of the Range of Variables in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Instrumentation and Control

UEENEEI156A Develop and test code for microcontroller devices

Modification History

Release	Action	Core/Elective	Details	Points
		UEENEEI156A	Develop and test code for microcontroller devices	
2	Editorial	N/A	In Pre-requisites, delete “For the full prerequisite chain details for this unit please refer to Table 2 in Volume 1, Part 2”.	
2	Editorial	N/A	In Required Skills and Knowledge, insert topic numbering.	
2	Editorial	N/A	Replace “essential knowledge and associated skills” with “required skills and knowledge”.	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This competency standard unit covers structured programming instructions for micro devices at a fundamental level. The unit encompasses working safely, applying knowledge device architecture and programming fundamentals, writing and testing specified instructions and documenting development activities.

Note.

In this unit the term ‘micro’ refers to microcontrollers however competency in the unit can be achieved using microprocessors.

Application of the Unit

Application of the Unit 2)

This competency standard unit is intended to apply to any recognised development program that leads to the

acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships and the like.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1	Prepare to develop and test basic specifications.	1.1	OHS processes and procedures for a given work area are obtained and understood.
		1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
		1.3	The extent of specifications to be developed is determined from job performance requirements and in consultations with relevant persons.
		1.4	Activities are planned to meet scheduled timelines in consultation with others involved on the work.
		1.5	Appropriate development kit and software are selected based on specified requirements and performance standard.
		1.6	Strategies are implemented to ensure programming is carried out efficiently.

ELEMENT	PERFORMANCE CRITERIA
2 Develop basic specification.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Knowledge of micro controller functions and features are applied to developing specifications.
	2.3 Correct structure and syntax is applied to developing program specification for target micro controller function.
	2.4 Key features of the assembler programming language are applied to develop and test solutions.
	2.5 Approaches to issues/problems are analysed to provide most effective solutions.
	2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.
3 Test and document the basic specification.	3.1 Testing procedures are developed to analyse code developed.
	3.2 Problems and bugs are rectified to ensure specification the creation of the code is met.
	3.3 Intermediate and final work reports are written in accordance with professional standards and presented to appropriate person or persons.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the required skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing and testing code for microcontroller devices.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EI156A Microcontroller programming

Evidence shall show an understanding of microcontroller control system programming methods to an extent indicated by the following aspects:

T1 Microcontroller architecture encompassing:

- Program storage types
- Data storage types
- I/O Ports: analogue/ digital
- Integrated Peripherals: timers, interrupts etc
- Control circuitry: system clock, reset etc

T2. Programmer's model encompassing:

- Industry standard programming environment

T3. Programming terms encompassing:

- Language levels and their features
- Language simulators and emulators

T4. Language programming basics encompassing:

- Programming input/output functions
- Input/output port programming
- Structured assembly programming
- Timing loops

T5. Memory organisation, operation and addressing methods encompassing:

- register structure
- instruction register/decoder
- arithmetic logic unit (ALU)
- accumulator and flags
- instruction cycle timing
- control lines
- stack pointer
- index register

T6. System clock circuits fetch and execute encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- timing cycle
- timing relationship to system clock
- logic levels of system buses for each clock period of an instruction cycle

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing

on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

**Critical aspects
of evidence
required to
demonstrate
competency in
this unit** 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UEE11”. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the required knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.; and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures; and
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:

- Develop and test code for microcontroller devices as described in 8) and including:
 - A Using all key features of an appropriate assembler language.
 - B Developing testing procedures.
 - C Identifying problem and bugs in program.
 - D Rectifying problem and bugs in program.
 - E Writing and presenting work reports to an acceptable standard.
 - F Dealing with unplanned events by drawing on required knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this competency standard unit.

Resources required to assess this unit are listed above in context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to developing and testing code for microcontroller devices.

Method of assessment **9.4)**

This competency standard unit shall be assessed by methods given in Volume 1, Part 3 “Assessment Guidelines”.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires that the specified required knowledge and skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to developing and testing code for microcontroller devices including at least three of the following:

- Selecting an appropriate micro for a given task
- Setting up and using basic input/output functions
- Using assembler/simulator software packages to debug program
- Finding system faults.

Generic terms are used throughout this Vocational Standard shall be regarded as part of the Range of Variables in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Instrumentation and Control

UEENEEK101A Maintain safety and tidiness of remote area power supply systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers maintaining safety of remote area power supply (RAPS) system by ensuring that only RAPS equipment is present and is in its allotted place and that the system is free of litter. It encompasses working safely, regularly checking systems, cleaning techniques and reporting safety issues.

Application of the Unit

Application of the Unit 2)

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health Safety regulations, codes and practices in the workplace

UEENEEK1 02A Work safely with remote area power supply systems

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to maintain safety and tidiness of RAPS system	1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor.
	1.4 The nature and location of the RAPS system is obtained from work schedule and supervisor to establish the scope of work to be undertaken.
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community.
	1.6 Tools and equipment needed to carry out the cleaning work are obtained and checked for correct operation and safety
2 Maintain safety and tidiness of RAPS system	2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits/machines/system are checked as being isolated where necessary in strict accordance

ELEMENT	PERFORMANCE CRITERIA
	OHS requirements and procedures.
	2.4 Routine procedures are used to clean RAPS system and area.
	2.5 Cleaning is carried out efficiently without waste of materials and energy or damage to apparatus, circuits, the surrounding environment or services.
	2.6 Routine quality checks are carried out in accordance with work instructions.
3 Complete work and report	3.1 OHS risk control work completion measures and procedures are followed.
	3.2 Procedures for referring cleaning and tidiness issues to the local community are followed.
	3.3 Completion of cleaning work and issues are reported to work supervisor in accordance with established routines.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and maintaining safety and tidiness of remote area power supply (RAPS) systems

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK101A RAPS plant area cleaning

Evidence shall show an understanding of cleaning and maintaining remote area power supply (RAPS) systems to an extent indicated by the following aspects:

REQUIRED SKILLS AND KNOWLEDGE

- Needs for a clean and tidy plant area
- RAPS system components and associated equipment and their location within the plant area
- manual fuel pump if available
- Plant cleaning techniques:
 - Fuel and oil
 - acid spills;
 - removal of dust, insects, spiders, animals
 - removal of non-RAPS equipment
- Technique for reporting and dealing with cleaning issues.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place,

access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a

percentile graded result for the purpose of regulatory or licensing requirements.

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
- Maintain safety and tidiness of remote area power supply systems as described in 8) and including:

- A Removing non-RAPS equipment
- B Safely removing insects, spiders and any animals
- C Safely removing dust and dirt from floors and equipment
- D Identifying and reporting at least two safety issues
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry

practices in relation to maintaining safety and tidiness of remote area power supply systems.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5) There are no concurrent assessment recommendations for this unit.

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with units UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems incorporating a battery bank and at least two of the following:

- Generator set
- Photo voltaic array
- RAP system
- Wind generator

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Renewable and Sustainable Energy

UEENEEK102A Work safely with remote area power supply systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers safety practices for working on remote area power supply (RAPS) systems. It encompasses identifying safety hazards, using risks control measures and following routine procedures for prescribed system maintenance.

Note:

Components of this unit are included in the critical aspects of evidence in each applicable unit to ensure that OHS practices are demonstrated as they apply to RAPS system servicing work functions and situations

Application of the Unit

Application of the Unit 2)

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However,

License to practice 3)

practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEE1 01A Apply Occupational Health Safety regulations, codes and practices in the workplace

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to enter a RAPS system	1.1 Instruction in hazards and risk control measures for RAPS systems maintenance are identified, obtained and understood.
	1.2 System access permit is obtained from work supervisor.
	1.3 Preparations for electrical and non-electrical isolation are made to prevent creation of hazards
	1.4 Tools and equipment needed for the work are checked for safety and correct functionality according to established safety routines.
2 Apply safe working practices in RAPS system area.	2.1 Workplace procedures and work instructions for controlling risk are followed accurately.
	2.2 Workplace procedures for dealing safe working practices in RAPS system are followed according to prescribed work procedures.
	2.3 Circuits/machines/system are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Routine procedures are used to apply safe working practices in RAPS system and area.
	2.5 Safe working practices are carried out efficiently without waste of materials and energy or damage to apparatus, circuits, the surrounding environment or services.
	2.6 Routine quality checks are carried out in accordance with work instructions.

ELEMENT	PERFORMANCE CRITERIA
3. Follow workplace procedures for hazard identification and risk control in RAPS system areas	3.1 Hazards are identified and prescribed control measures implemented and monitored through active participation in the consultation process with employer, other employees and local community.
	3.2 Hazards in the work are recognised and reported to work supervisor personnel according to established procedures.
	3.3 OHS records of incidents are completed in accordance with regulatory requirements and established procedures
	3.4 Workplace instructions and training are followed accurately within established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and working safely with remote area power supply (RAPS) systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK102A Remote area power supply safe working practice

Evidence shall show an understanding of RAPS safe working practices to an extent indicated by the following aspects:

General safety encompassing:

- General safety
- Risk assessment
- Personal protective equipment
- OHS procedures

RAPS safety and risk assessment encompassing:

- Types of hazards in and around remote area power supplies

Note: In addition to the safety hazards found in most workplace RAPS systems are likely to have the hazards related to electricity

REQUIRED SKILLS AND KNOWLEDGE

supplied from more than one source, rotating machines, fuels and oils, exhaust fumes, and acids and flammable gases from batteries.

- Measures for dealing with hazards in and around remote area power supplies
- Purpose and methods for isolation and de-energisation of power supplies

Correct isolation and de-energisation procedures encompassing:

- Processes for preventing generator from automatically starting
- Isolating photo voltaic arrays,
- Isolating wind driven generators,
- Isolating battery
- Isolating inverter power sources

Safety signage encompassing:

- Types of signs
- Location
- Condition
- Suitability

Access to system encompassing:

- Methods for limiting access to plant areas

Reporting

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment

Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Work safely with remote area power supply (RAPS) systems as described in 8) and including:

A Preparing to enter the RAPS system including, permission to enter the area and to isolate RAPS equipment

- B Applying work procedures and instructions as they apply to risk control measures
- C Dealing with accidents and emergencies
- D Participating in consultation processes, identifying hazards and implementing and monitoring control measures
- E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to working safely with remote area power supply (RAPS) systems.

Method of assessment 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

For optimisation of training and assessment effort, competence development in this unit may be arranged concurrently with other units in a qualification or possible skill clusters in which this unit is included.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems incorporating a battery bank, a generator set and a photo voltaic array and at least one similar RAPS system with the additions of a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Renewable and Sustainable Energy

UEENEEK103A Conduct periodic maintenance of remote area power supply battery banks

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers maintenance of remote area power supply (RAPS) battery banks where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of battery faults using routine procedures and completing the necessary maintenance reporting.

Application of the Unit

Application of the Unit 2)

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health Safety regulations, codes and practices in the workplace

UEENEEE1 02A Fabricate, dismantle, assemble of utilities industry components

UEENEEK1 01A Maintain safety and tidiness of remote area power supply systems

UEENEEE1 07A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEK1 02A Work safely with remote area power supply systems

UEENEEE1 31A Solve problems in ELV circuits for non electrical workers

OR

UEENEEE1 04A Solve problems in d.c. circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to conduct periodic maintenance of battery banks	<p>1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed</p> <p>1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor</p> <p>1.4 The nature and location of RAPS system is identified from documentation or from work supervisor to establish the scope of work to be undertaken</p> <p>1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with</p>

ELEMENT

PERFORMANCE CRITERIA

- fellow workers and the local community
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
- 2 Maintain RAPS systems battery banks.
- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Prescribed maintenance procedures are used to test and check RAPS system battery banks
- 2.5 Battery bank maintenance, including performance measurements and repairs are carried out safely and to prescribed routines and procedures
- 2.6 Known types of battery functional faults are identified using routine fault finding procedures
- 2.7 Procedures are followed for referring non-routine events to immediate supervisor for directions
- 2.8 Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services
- 2.9 Routine quality checks are carried out in accordance with work instructions

ELEMENT	PERFORMANCE CRITERIA
3 Complete maintenance work on battery banks and report.	3.1 OHS work completion risk control measures and procedures are followed
	3.2 Work site is cleaned and made safe in accordance with routine procedures
	3.3 Procedures for referring local maintenance issues to the community are followed
	3.4 Battery bank performance measurements are reported to the work supervisor through the established maintenance reporting procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and conducting periodic maintenance of remote area power supply (RAPS) battery banks.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK103A RAPS systems battery bank maintenance techniques

Evidence shall show an understanding of maintaining RAPS battery systems to an extent indicated by the following aspects:

- T1 Basic battery maintenance encompassing:
- scope of regular testing, checking and corrective actions
 - measurement of specific gravity and voltages of battery cells;
 - checking and topping up electrolyte levels;
 - checking for acid leakage, cracks in battery casing, corrosion of battery terminals and connections,
 - cleaning of terminal connections and treating with an anticorrosive

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment

Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Conduct periodic maintenance of remote area power supply (RAPS) battery banks as described in 8) and including:

A Measuring and recording specific gravity of electrolyte

B Measuring and recording cell voltages

C	Visual inspecting of batteries for low electrolyte levels; electrolyte leakage corroded terminals and connections
D	Topping up low electrolyte levels
E	Identifying electrolyte leaks
F	Cleaning corroded terminals and connections and treating with an anticorrosive
G	Reporting all maintenance activities
H	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to conducting periodic maintenance of remote

area power supply (RAPS) battery banks.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEK10 4A Conduct periodic maintenance of remote area power supply generator sets

UEENEEK10 5A Conduct periodic maintenance of remote area power supply photo voltaic arrays

UEENEEK10 6A Conduct periodic maintenance of remote area power supply wind generators

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems in which the battery bank is charged from a generator set and a photo voltaic array and at least one similar RAPS system where the battery bank is charged form a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Renewable and Sustainable Energy

UEENEEK104A Conduct periodic maintenance of remote area power supply generator sets

Modification History

Release	Action	Core/Elective	Details	Points
2	Edit		Show full pre-req chain in the unit	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers maintenance of remote area power supply (RAPS) generator sets where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of generator faults using routine procedures and completing the necessary maintenance reporting

Application of the Unit

Application of the Unit 2)

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not

License to practice

3)

require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health Safety regulations, codes and practices in the workplace

UEENEEE1 02A Fabricate, dismantle, assemble of utilities industry components

UEENEEK1 01A Maintain safety and tidiness of remote area power supply systems

UEENEEE1 07A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEK1 02A Work safely with remote area power supply systems

UEENEEE1 31A Solve problems in ELV circuits for non electrical workers

OR

UEENEEE1 04A Solve problems in d.c. circuits

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills

indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to conduct periodic maintenance on generator sets	1.1	OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed
	1.3	Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
	1.4	The nature and location of RAPS system is identified from documentation or from work

ELEMENT	PERFORMANCE CRITERIA
	supervisor to establish the scope of work to be undertaken
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community
	1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
	1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Maintain RAPS systems generator sets	2.1 Established OHS risk control measures and procedures for carrying out the work are followed
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
	2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
	2.4 Prescribed maintenance procedures are used to test and check RAPS system generator sets
	2.5 Generator set maintenance, including performance measurements and repairs, are carried out safely and to prescribed routines and procedures
	2.6 Known types of generator set functional faults are identified using routine fault finding procedures
	2.7 Procedures are followed for referring non-routine events to immediate supervisor for directions
	2.8 Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the

ELEMENT	PERFORMANCE CRITERIA
	surrounding environment or services
	2.9 Routine quality checks are carried out in accordance with work instructions.
3 Complete maintenance work of generator sets and report	3.1 OHS work completion risk control measures and procedures are followed
	3.2 Work site is cleaned and made safe in accordance with routine procedures
	3.3 Procedures for referring local maintenance issues to the community are followed
	3.4 Generator set performance measurements are reported to the work supervisor through the established maintenance reporting procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and conducting periodic maintenance of remote area power supply (RAPS) generator sets.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK104A RAPS system generator sets maintenance techniques

Evidence shall show an understanding of maintaining remote area power supply generator sets to an extent indicated by the following aspects:

- T1 Basic generator set maintenance encompassing:
- Checking of radiator and oil level;
 - Periodic oil change
 - Periodic air, oil and fuel filter change.
 - Maintaining log books for maintenance regime

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment

Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Conduct periodic maintenance of remote area power supply (RAPS) generator sets as described in 8) and including:

A Measuring and recording generator no-load and load voltages

B Measuring and recording generator output for three load conditions

C	Checking drive engine coolant and oil level
D	Visually inspecting drive engine for coolant and oil leaks
E	Checking condition of drive engine oil, oil filter and air filter
F	Identifying need to change drive engine oil, oil filter and air filter
G	Changing drive engine oil, oil filter and air filter
H	Topping up low coolant and oil levels
I	Identifying the cause of any coolant and oil leaks
J	Reporting all maintenance activities
K	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to conducting periodic maintenance of remote

area power supply (RAPS) generator sets.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEK10 3A Conduct periodic maintenance of remote area power supply battery banks

UEENEEK10 5A Conduct periodic maintenance of remote area power supply photo voltaic arrays

UEENEEK10 6A Conduct periodic maintenance of remote area power supply wind generators

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems in which the generator set is charged from a generator set and a photo voltaic array and at least one similar RAPS system where the generator set is charged form a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Renewable and Sustainable Energy

UEENEEK105A Conduct periodic maintenance of remote area power supply photo voltaic arrays

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers maintenance of remote area power supply (RAPS) photo voltaic arrays where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of photo voltaic array faults using routine procedures and completing the necessary maintenance reporting.

Application of the Unit

Application of the Unit 2)

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health Safety regulations, codes and practices in the workplace

UEENEEE1 02A Fabricate, dismantle, assemble of utilities industry components

UEENEEK1 01A Maintain safety and tidiness of remote area power supply systems

UEENEEE1 07A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEK1 02A Work safely with remote area power supply systems

UEENEEE1 31A Solve problems in ELV circuits for non electrical workers

OR

UEENEEE1 04A Solve problems in d.c. circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to conduct periodic maintenance on photo voltaic arrays	1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor.
	1.4 The nature and location of RAPS system is identified from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with

ELEMENT

PERFORMANCE CRITERIA

- fellow workers and the local community.
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
- 2 Maintain RAPS systems photo voltaic arrays
- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
- 2.4 Prescribed maintenance procedures are used to test and check RAPS system photo voltaic arrays.
- 2.5 Photo voltaic array maintenance, including performance measurements and repairs are carried out safely and to prescribed routines and procedures.
- 2.6 Known types of photo voltaic array functional faults are identified using routine fault finding procedures.
- 2.7 Procedures are followed for referring non-routine events to immediate supervisor for directions.
- 2.8 Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services
- 2.9 Routine quality checks are carried out in accordance with work instructions.

ELEMENT	PERFORMANCE CRITERIA
3 Complete maintenance work of photo voltaic arrays and report	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with routine procedures.
	3.3 Procedures for referring local maintenance issues to the community are followed.
	3.4 Photo voltaic array performance measurements are reported to the work supervisor through the established maintenance reporting procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and conducting periodic maintenance of remote area power supply (RAPS) photo voltaic arrays sets.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK105A RAPS systems photovoltaic array maintenance techniques

Evidence shall show an understanding of maintaining remote area power supply (RAPS) photovoltaic arrays to an extent indicated by the following aspects:

T1 RAPS systems photovoltaic array maintenance techniques encompassing:

- Cleaning of photo voltaic modules
- Checking for damage or de-lamination
- Checking of module connections, connecting cable and integrity of the array structure
- Maintaining log books and maintenance regime

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment

Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies & workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Conduct periodic maintenance of remote area power supply (RAPS) photo voltaic arrays as described in 8) and including:

A Measuring and recording array no-load and load voltages together with ambient temperature

B Measuring and recording array output for three

- load conditions
- C Visually inspecting array modules and support structure for physical damage
- D Visually inspecting array connections and cables
- E Identifying array defects and faults
- F Reporting all maintenance activities
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to conducting periodic maintenance of remote area power supply (RAPS) photo voltaic arrays.

Method of assessment 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEK10 3A Conduct periodic maintenance of remote area power supply battery banks

UEENEEK10 4A Conduct periodic maintenance of remote area power supply generator sets

UEENEEK10 6A Conduct periodic maintenance of remote area power supply wind generators

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems in which the photo voltaic array is charged from a photo voltaic array and a photo voltaic array and at least one similar RAPS system where the photo voltaic array is charged from a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Renewable and Sustainable Energy

UEENEEK106A Conduct periodic maintenance of remote area power supply wind generators

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers maintenance of remote area power supply (RAPS) wind generators where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of wind generator faults using routine procedures and completing the necessary maintenance reporting.

Application of the Unit

Application of the Unit 2)

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health Safety regulations, codes and practices in the workplace

UEENEEE1 02A Fabricate, dismantle, assemble of utilities industry components

UEENEEK1 01A Maintain safety and tidiness of remote area power supply systems

UEENEEE1 07A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEK1 02A Work safely with remote area power supply systems

UEENEEE1 31A Solve problems in ELV circuits for non electrical workers

OR

UEENEEE1 04A Solve problems in d.c. circuits

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to conduct periodic maintenance on wind generators	<p>1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures</p> <p>1.2 Established OHS risk control measures and procedures in preparation for the work are followed.</p> <p>1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor.</p> <p>1.4 The nature and location of RAPS system is identified from documentation or from work supervisor to establish the scope of work to be undertaken.</p> <p>1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with</p>

ELEMENT

PERFORMANCE CRITERIA

- fellow workers and the local community.
- 1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures.
- 1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
- 2 Maintain RAPS systems wind generators
- 2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
- 2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
- 2.3 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
- 2.4 Prescribed maintenance procedures are used to test and check RAPS system wind generators
- 2.5 Wind generator maintenance, including performance measurements and repairs, are carried out safely and to prescribed routines and procedures.
- 2.6 Known types of wind generator functional faults are identified using routine fault finding procedures.
- 2.7 Procedures are followed for referring non-routine events to immediate supervisor for directions.
- 2.8 Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services
- 2.9 Routine quality checks are carried out in accordance with work instructions.

ELEMENT	PERFORMANCE CRITERIA
3 Complete maintenance work of wind generators and report	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with routine procedures.
	3.3 Procedures for referring local maintenance issues to the community are followed.
	3.4 Wind generator performance measurements are reported to the work supervisor through the established maintenance reporting procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and conducting periodic maintenance of remote area power supply (RAPS) wind generators.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK106A RAPS systems wind generator maintenance techniques

Evidence shall show an understanding of maintaining small wind generator systems to an extent indicated by the following aspects:

- T1 Wind generator minor maintenance encompassing:
- Checking the integrity of support structure
 - Tension of stay wires
 - Visual inspection of wind generator operation
 - Maintaining log books and maintenance regime

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment

Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Conduct periodic maintenance of remote area power supply (RAPS) wind generators as described in 8) and including:

A Measuring and recording generator no-load and load voltages;

B Measuring and recording generator output for three load conditions;

- C Visually inspecting generator and support structure for physical damage;
- D Visually inspecting generator connections and cables;
- E Identifying generator defects and faults;
- F Reporting all maintenance activities
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to conducting periodic maintenance of remote area power supply (RAPS) wind generators.

Method of assessment 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEK10 3A Conduct periodic maintenance of remote area power supply battery banks

UEENEEK10 4A Conduct periodic maintenance of remote area power supply generator sets

UEENEEK10 5A Conduct periodic maintenance of remote area power supply photo voltaic arrays

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to at least two different RAPS systems in which the battery bank is charged from a generator set and a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Renewable and Sustainable Energy

UEENEEK116A Maintain and repair remote area power generation facilities

Modification History

Release	Action	Core/Elective	Details	Points
2	Edit		Show full pre-req chain in the unit	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers basic maintenance of power generation facilities in remote areas. It encompasses working safely, following maintenance schedules to inspect, repair, replace and adjustment equipment, maintaining a clean and efficient generation facility and completing the necessary reporting.

Application of the Unit

Application of the Unit 2)

This unit is intended primarily for indigenous persons seeking qualifications in remote area utilities facilities servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace. However,

License to practice**3)**

practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed plus all the competencies in one (1) of the identified Pathway Unit Group(s):

Electrotechnology

Remote Area

Common Unit Group

UEENEEE1 01A Apply Occupational Health and Safety regulations, codes and practices in the workplace

Prerequisite Unit(s) 4)

UEENEEE1 02A Fabricate, assemble and dismantle utilities industry components

UEENEEE1 07A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEK1 01A Maintain safety and tidiness of remote area power supply systems

UEENEEK1 02A Work safely with remote area power supply systems

UEENEEK1 04A Conduct periodic maintenance of remote area power supply generator sets

Electrotechnology Pathway Group

UEENEEE1 04A Solve problems in d.c. Circuits

Remote Area Pathway Group

UEENEEE1 31A Solve problems in ELV circuits for non electrical workers

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information**Employability Skills 5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the

Employability Skills

5)

qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit
 Performance Criteria describe the required performance needed to demonstrate achievement of the element.
 Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria**ELEMENT****PERFORMANCE CRITERIA**

1 Prepare to maintain and repair remote area power generation facilities	1.1 OHS procedures for a remote area power station facility are identified, obtained and understood through established routines and procedures
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
	1.4 The nature and location of remote area power station facility is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community
	1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
	1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for

ELEMENT	PERFORMANCE CRITERIA
	correct operation and safety.
2 Maintain and repair remote area power generation facilities	2.1 Established OHS risk control measures and procedures for carrying out the work are followed
	2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
	2.2 Inspection, repairs, replacements and/or adjustments are carried out on items listed in the maintenance schedule and in accordance with established procedures.
	2.3 Fuel, coolant, oil and other fluid spills are cleaned and area made safe in accordance with established procedures.
	2.4 Batteries are serviced and/or replaced as specified in the maintenance schedule and in accordance with established procedures.
	2.5 Consumables are removed and disposed of following environmentally safe procedures.
	2.6 Procedures are followed for referring non-routine events to immediate supervisor for directions
	2.7 Routine quality checks are carried out in accordance with work instructions
3 Report maintenance and repair of remote area power generation facilities	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Procedures are followed for referring maintenance issues beyond the scope of prescribed work to persons of higher authority.
	3.3 Work carried out is reported to the work supervisor through the established maintenance reporting procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and maintaining and repairing facilities associated with remote area essential service operations.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK116A Remote area essential services power plant

Evidence shall show an understanding of remote area essential services power plant to an extent indicated by the following aspects:

Minor service and maintenance procedures of diesel powered generation equipment in accordance with a prepared schedule encompassing:

- Types and grades of inspections, repairs, replacement and/or adjustments under a maintenance schedule:
 - Replacement items/materials include engine oil, oil filters, fuel filters, engine coolant system filters, air cleaners and fan belts;
 - Inspection and repair items include leakages from fuel system, coolant system and lubricating oil system.
- Cleaning of fluid spills.
- Environmentally safe procedures for removal and disposal of consumables.

Servicing batteries and battery packs in a community power station in accordance with the prepared maintenance schedule encompassing:

- Hazards associated with batteries.
- Types of batteries and their application in a community power station (Starting battery set, switchboard (nicad) batteries)
- Battery maintenance techniques

Schedule regular servicing and maintenance encompassing:

- Engine oil and filter changes;
- Fuel filters;
- Coolant filters

REQUIRED SKILLS AND KNOWLEDGE

- Water trap devices
- Drive belt (condition/adjustment);
- Valve adjustments (if applicable);
- Major and minor mechanical servicing by outside agents;
- Air cleaner (both dry paper and oil bath types)

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining

competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement.
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination

- legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Maintain and repair remote area power generation facilities as described in 8) and including:
 - A Understanding the location and nature of the work required
 - B Correctly inspecting, repairing, replacing and adjusting items listed in the maintenance schedule
 - C Cleaning fluid spills appropriately.
 - D Removing and disposing of consumable following environmentally safe procedures.
 - E Documenting work activities accurately
 - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence must be clearly identified

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to maintaining and repairing facilities associated with remote area essential service operations.

**Method of
assessment**

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units**

9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different remote area power generation facilities.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Renewable and Sustainable Energy

UEENEEK120A Maintain operation of remote area power generation plant

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers maintenance of remote area power generation plant where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of power plant faults using routine procedures and completing the necessary maintenance reporting.

Application of the Unit

Application of the Unit 2)

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a license to practice in the workplace provided equipment is not connected to installation wiring at voltages above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

License to practice**3)**

Note.

Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage electrical installations is incorporated in unit UEENEEG105A and all prerequisite units it specifies.

Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Pre-Requisites**Prerequisite Unit(s)****4)****Competencies****4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK1 16A Maintain and repair remote area power generation facilities

Literacy and numeracy skills**4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each

scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Maintain operation of remote area power generation plant	1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
	1.4 The nature and location of the power plant is obtained from documentation or from work supervisor to establish the scope of work to be

ELEMENT	PERFORMANCE CRITERIA
	undertaken
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community
	1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
	1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Maintain operation of remote area power generation plant	2.1 Established OHS risk control measures and procedures for carrying out the work are followed
	2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
	2.3 Prescribed maintenance procedures are used to test and check remote area power plant
	2.4 Known types of remote area power plant functional faults are identified and repaired using routine procedures
	2.5 Maintenance, including performance measurements and repairs are carried out safely and to prescribed routines and procedures
	2.6 Procedures are followed for referring non-routine events to immediate supervisor for directions
	2.7 Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services
	2.8 Routine quality checks are carried out in accordance with work instructions

ELEMENT	PERFORMANCE CRITERIA
3 Complete maintenance work and report	3.1 OHS work completion risk control measures and procedures are followed
	3.2 Work site is cleaned and made safe in accordance with routine procedures
	3.3 Procedures are followed for referring maintenance issues beyond the scope of prescribed work to persons of higher authority
	3.4 Work carried out is reported to the work supervisor through the established maintenance reporting procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and maintaining operation of remote area power generation plant.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK120A Remote area essential services power generation plant

Evidence shall show an understanding of remote area essential services power plant maintenance to an extent indicated by the following aspects:

T1 Minor servicing of a power station's generating plant encompassing:

- Engine oil and filters
- Fuel filters
- Coolant filters
- Water trap devices
- Air cleaners

T2 Minor maintenance of a power station's generating plant encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Fan and accessory drive belts
- Repair of minor leaks: coolant, oil and fuel

T3 Servicing of a power station's generating plants battery systems encompassing:

- Starting battery set
- Switchboard (nicad) batteries

T4 Information displayed by the instruments/meters in a power station encompassing:

- Generating equipment (diesel engine)
- Engine lubrication
- System oil pressure
- Engine cooling system coolant
- Temperature (in and out)
- Fuel pressure
- Current (A)
- Voltage
- Power (kW)
- Kilowatt hours
- Frequency, hertz (Hz)
- Engine running hours
- Station services: Fuel tank dip; Lubricating oil tank level;
- Fuel flow meter

T5 Use of the information gathered from instruments/meters encompassing:

- Ordering of: Fuel; Lubricating oil; Coolant
- Schedule regular servicing and maintenance for: Engine oil and filter changes; Fuel filters; Drive belt (condition/adjustment); Valve adjustments (if applicable); Major and minor mechanical servicing by outside agents; Air cleaner (both dry paper and oil bath types)

T6 Power station log sheets and readings encompassing:

- Completed log sheets
- Forwarding information to appropriate person/location at regular intervals (weekly)

T7 General cleanliness of the power stations plant and buildings encompassing:

- Generation plant

REQUIRED SKILLS AND KNOWLEDGE

- Oil leaks
- Water leaks
- Fuel leaks
- Safety awareness
- Plant buildings
- Internal floor area
- Used consumables
- Spare parts storage
- Spider webs and other pests
- Rubbish containers
- Ventilation
- Power station compound
- Fence and gate (if applicable)
- Weeds
- Grass (if applicable)
- Rubbish containers
- Fuel and oil supply, (drums)
- Water reticulation (if applicable)
- Tools and equipment
- Location/storage
- Cleanliness
- Maintenance
- Drain/drip tins
- Safety signage
- Location
- Condition
- Suitability

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment

Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Maintain operation of remote area power generation plant as described in 8) and including:

- A Understanding the location and nature of the work required
- B Following prescribe procedures to testing and checking plant.

- C Identifying and repairing known functional faults
- D Carrying out maintenance and repairs effectively.
- E Identifying maintenance issues beyond the scope of prescribed work and notifying appropriate persons.
- F Documenting work activities accurately.
- G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to maintaining operation of remote area power generation plant.

Method of assessment 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to maintaining operation of at least two different remote area power plants.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Renewable and Sustainable Energy

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This competency standard unit requires the worker to undertake methods of work practice that minimises energy and material usage and to seek energy reduction strategies in the energy sector workplace. The unit seeks to minimise negative impacts on the environment.

Application of the Unit

Application of the Unit 2)

This competency standards unit shall apply to persons entering work in energy sector and may be used in school based vocational programs.

Licensing/Regulatory Information

License to practice

3)

The skills and knowledge described in this unit do not require a licence to practice in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships and the like.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work

License to practice

3)

platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus, site rehabilitation and the like.

2. Compliance may be required in various jurisdictions relating to currency in first aid, confined space, lifting, risk safety measure and the like

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

There are no prerequisite competencies for this unit

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and maths skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills

5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan and prepare to apply sustainable work practice	1.1 Activities are planned and prepared for to ensure OHS policies and procedures are followed with the work appropriately sequenced in accordance with requirements
	1.2 Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved
	1.3 Materials are obtained and checked in accordance with established procedures and to comply with requirements
	1.4 Location in which activities are to be undertaken is determined from requirements
	1.5 Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements
	1.6 Workplace environmental risks and resource efficiency issues are identified
2 Apply sustainable work practice	2.1 OHS policies and procedures for undertaking administrative functions are followed
	2.2 Activities are undertaken in accordance with requirements to implement techniques which produce energy reduction directly or indirectly
	2.3 Unplanned events or conditions are responded to in accordance with established procedures
	2.4 Approval is obtained in accordance with established procedures from appropriate personnel before any contingencies are

ELEMENT	PERFORMANCE CRITERIA
	implemented
	2.5 On-going checks of the quality of the work are undertaken in accordance with established procedures
	2.6 Work is carried out efficiently without unnecessary waste of materials or damage to the surrounding environment, while using sustainable work practices which minimise wastage of energy and materials either directly or indirectly
3 Complete the application of sustainable work practice	3.1 Documentation/reports are completed to ensure detailed promotional activities requirements are met
	3.2 Suggestions are made for improvements to workplace practices to minimise energy and materials wastage
	3.3 Completion is notified in accordance with established procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and applying environmentally and sustainable work practices in the energy sector.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK142 Environmentally and sustainable work practice

A

Evidence shall show an understanding of environmentally and sustainable work practices to an extent indicated by the following aspects:

T1 Sustainable work practices encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- Notion of sustainable work practice
- Effects of neglecting sustainable work practice
- The greenhouse effect - causes, consequences.
- International and national greenhouse imperatives.
- The role of regulators and similar bodies
- Legislative requirements
- Economic benefits of sustainable initiatives.

T2 Techniques for reducing carbon produced energy and hence greenhouse gases encompassing:

- domestic, commercial and industrial strategies
- trade related technologies and methods
- energy efficient retrofits (overview).
- renewable energy technologies (overview)

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitude competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord

with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

The evidence on which competency in this unit is based shall be considered holistically for each element on at least two occasions comprising:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
 - Apply sustainable work practice principles and practices as specified in the performance criteria and range; and
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements. and
 - Demonstrate an appropriate level of skills enabling employment; and
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - Participate in environmentally sustainable work practices as listed in the Range statement' and including:

A Apply sustainable work practice in daily work activities

B Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this competency standard unit.

Resources required to assess this unit are listed above in Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above in Context of and specific resources for assessment, evidence should show demonstrated competency in participating in environmentally sustainable work practices.

Method of assessment 9.4)

This competency standard unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is

primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to participating in environmentally sustainable work practices in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electronics
- Fire protection
- Instrumentation and control
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms are used throughout this Vocational Standard shall be regarded as part of the Range of Variables in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Renewable and Sustainable Energy

UEENEEP024A Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers attaching flexible cords and plugs to electrical equipment for connection to supplies up to 230V a.c. This may be incidental to or a primary and regular function of work related to a principle function in the workplace. It encompasses working safely, identifying plug configurations, selecting and using testing and measuring devices, terminating and connecting cords/plugs and conductors, safety testing and reporting.

Application of the Unit

Application of the Unit 4)

This unit applies to any formal recognition for this standard at the aligned AQF 2 level or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit may require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

Candidates are to meet regulator eligibility requirements by providing formal confirmation from the relevant state/territory regulator for the respective work class and scope of work prior to developing and being conferred competent.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 Apply Occupational Health and Safety
01A regulations, codes and practices in the
 workplace

Employability Skills Information

Employability Skills 3)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT PERFORMANCE CRITERIA

- | | | |
|---|--|--|
| 1 | Plan and prepare to attach flexible cord(s) and plug(s). | <ul style="list-style-type: none">1.1 Work is planned and prepared to ensure OHS policies and procedures are followed, and the work is appropriately sequenced in accordance with requirements.1.2 Condition and ratings under which the flexible cords and plugs are to operate is determined from requirements and in consultation with appropriate personnel followed by written instruction.1.3 Flexible cords and plugs are selected to comply with standards and requirements for the condition and rating to be determined.1.4 Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements. |
|---|--|--|

- 1.5 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.
 - 1.6 Flexible cord(s) is prepared without damage to insulation and conductors and in accordance with requirements.
- 2 Attach flexible cord(s) and plug(s).
 - 2.1 OHS policies and procedures are followed.
 - 2.2 Single insulated metal framed equipment is earthed in accordance with requirements.
 - 2.3 The integrity of double insulated equipment is maintained in accordance with requirements.
 - 2.4 Conductors are connected to terminals in accordance with requirements to ensure the required polarity is affected.
- 3 Test equipment for operation and safety.
 - 3.1 Appropriate tests of the cord(s) and plug(s) connected to the electrical equipment are conducted in accordance with requirements and to established procedures to ensure safe installation and operation.
 - 3.2 Ongoing checks of the quality of work are undertaken in accordance with established procedures.
- 4 Locate and repair fault(s) in attached flexible cord(s) and plug(s).
 - 4.1 Electrical equipment and attached flexible cord(s) and plug(s) are isolated, where necessary, in accordance with established procedures.
 - 4.2 Other OHS policies and procedures are followed.
 - 4.3 Visual checks of the attached flexible cord(s) and plug(s) are carried out in accordance with established procedures to detect any abnormal or obvious damage or fault.
 - 4.4 Fault(s) in attached flexible cord(s) and plug(s) are confirmed and components to be replaced are determined and details recorded in accordance with established procedures.

- 4.5 Fault(s) in attached flexible cord(s) and plug(s) are repaired in accordance with established procedures, where necessary.
- 4.6 Approval is obtained in accordance with established procedures from appropriate personnel, before any contingencies are implemented.
- 5 Provide status report(s).
- 5.1 Status report(s) are completed and notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and attaching cords and plugs to electrical equipment for connection to a single phase 230 Volt supply.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EP024A

Flexible cords and plugs to 230 V

Evidence shall show an understanding of flexible cords and plugs to 230 V to an extent indicated by the following aspects

T1 Safety encompassing:

* OH&S and electrical safety requirements

* requirements of AS/NZS 4836:2001 Safe working practices on low voltage installations

T2 The basic electrical circuit encompassing:

- * simple electric circuit (supply, control device and load)
- * symbol, units of measurement and the abbreviation for electromotive force, potential difference, current and resistance.
- * drawing of a basic electrical circuit using correct symbols
- * using multiples and submultiples for voltage, current and resistance values
- * a.c and d.c supplies
- * single phase electrical loads
- * electrical circuit protection devices

T3 Relationships in an electrical circuit encompassing:

- * relationship between voltage, current and resistance (Ohm's law)
- * changes in circuit parameters for altered values of voltage, current and resistance
- * electrical power in relationship to d.c. or resistive a.c. circuits

T4 Test Equipment - resistance measurement encompassing:

- * types of electrical test equipment used for resistance measurement (analogue and digital multimeters, insulation resistance testers and continuity testers)
- * selection of appropriate electrical test instrument for continuity and insulation resistance measurement
- * using analogue and digital multimeters for resistance measurement (ensuring zero setting, correct scale selection, avoidance of parallax error and estimation of between division readings for analogue multimeters)
- * continuity tests and using a continuity tester to check

the polarity of a three core extension cord

* insulation resistance tests and minimum values for insulation resistance for low voltage equipment

* reasons for insulation resistance testing is conducted at higher than supply voltage (AS/NZS3000 requirements)

* using insulation resistance hand held tester

* care and storage of electrical instruments

* regulatory requirements in regard to the maintenance and testing of test instrumentation for resistance measurement.

T5 Selection of flexible cords and plugs to suit given applications encompassing:

* types , structures and applications of common cores (parallel two core unsheathed ('figure 8') cords, light duty sheathed, ordinary duty sheathed, heavy duty sheathed and textile braided)

* determining the current rating of a range of commonly used flexible cords

* service duty

* purpose of colour coding and the recommended single phase colour code and the conventional code used in the most common alternative colours

* selection of appropriate flexible cords for a range of single phase appliances in regard to application, load, and service duty

* identification of correct plug and socket polarities for the range of commonly used 230 volt plug socket combinations

* factors affecting the choice of plugs and sockets including IP rating

* selection of the correct plug and socket combinations for a range of applications including use in damp areas

T6 Connecting flexible cords and plugs to appliances encompassing:

- * design features of plugs and sockets which protect the conductor terminations from undue force when disconnecting a cord - tortuous path
- * cord preparation - not to mark/damage the inner core when stripping the sheath for termination, double the end of the conductor to be terminated
- * purpose of earthing
- * structure of double insulated appliances, symbol, reasons they should not be earthed, and maintenance of the integrity of the double insulation
- * preparation of the surfaces at an earthing connection before and after completion of the termination including terminations exposed to corrosion, and those for which no specific earthing terminal is provided
- * fitting a range of various plugs and sockets with attention to requirements, colour code, polarity, and correct termination of conductors with the sheath well into the body, and the cord grip anchored
- * terminate cords to several appliances utilising the appropriate cord type and rating

T7 Testing encompassing:

- * importance of conducting both visual and electrical tests to ensure leads are safe and appropriate for connection to supply in regard to physical condition, sufficiently high insulation resistance, continuity, arrangements for protection against indirect contact are undamaged and in place, appropriate IP rating, and arrangements for protection against dangers of mechanical movement as relevant are undamaged and in place
- * check polarity of plug, and for any abnormal or obvious damage or fault
- * minimum acceptable value of insulation resistance between active neutral and earth
- * conduct insulation resistance and continuity tests

prior to, and after, connecting cords and plugs to appliances

* fault finding attached cords and plugs, and cord extension leads

T8 Producing documentation and reports encompassing:

* nature and content of, and the need to produce, status reports and documents

* Producing status reports and documents

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

EVIDENCE GUIDE

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'.

Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply as described in 8) and including:
 - A Demonstrating consistent performance for each element of the unit
 - B Meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources

EVIDENCE GUIDE

available in the workplace

- C Demonstrating an understanding of the underpinning knowledge and skills shown in the Essential Knowledge and Associated Skills section of the unit
- D Planning and preparing to attach flexible cord(s) and plug(s) up to 230 V a.c
- E Attaching, replacing and repairing flexible cord(s) and plugs(s) to equipment, safely up to 230 V a.c
- F Testing flexible cord(s), plugs(s) and connected equipment for operation and safety up to 230 V a.c., including polarity and continuity testing
- G Finding and repairing fault(s) in attached flexible cord(s) and plug(s) in accordance with established procedures
- H Providing status report(s)
- I Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.
- Workplace evidence to be produced in an industry/regulator approved recording system (logbook) confirming skills development under appropriate supervision

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to attaching cords and plugs to electrical equipment for connection to a single phase 230 Volt supply.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any cord, cable and plug connected equipment or cord extension leads intended for single-phase supplies up to 230 V.

Note:

Limitations of this unit. This unit does not cover the knowledge and skills necessary for work:

- a) Competencies associated with high current faults
- b) On complex electrical apparatus, circuits and electrical work
- c) In hazardous areas or on electrical equipment that is part of an explosion protection technique
- d) Nor competencies associated with fixed wiring.

Safe Working. Safe procedures for working within in the scope of this unit shall be in accordance with AS/NZS 4836:2001 'Safe working on low-voltage electrical installations.'

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Custom Content Section

2.2) Literacy and numeracy skills

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3
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Competency Field

Competency Field 5)

Restricted and Specialisations

UEENEEP026A Conduct in-service safety testing of electrical cord connected equipment and cord assemblies

Modification History

Release	Action	Core/Elective	Details	Points
2	Edit		Add "Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed" in Competencies 4.1	

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit covers safety testing of electrical cord connected equipment and cord assemblies. It encompasses working safely, using portable apparatus tester, identifying faults, applying tagging, arranging for repair of faulty equipment and complete testing documentation.

Application of the Unit

Application of the Unit 2)

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit may require a license to practice in the workplace. However, practice in this unit is subject to regulations directly

License to practice

3)

related to occupational health and safety, general electrical safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE1 01A Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT

PERFORMANCE CRITERIA

1 Prepare to test cord connected apparatus and cord assemblies	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	OHS risk control work preparation measures and procedures are followed.
	1.3	Advice is sought from an appropriate person to minimise disruption to the work place.
	1.4	Cord connected apparatus and cord assemblies to be tested are obtained.
	1.5	Portable apparatus testing device is checked for correct operation and safety.
2 Test cord connected apparatus and cord assemblies	2.1	OHS risk control work measures and procedures are followed.
	2.2	Measures are followed to ensure that cord

ELEMENT

PERFORMANCE CRITERIA

- connected apparatus and cord assemblies to be tested are not connected to the electrical supply.
- 2.3 Knowledge of electrical safety requirements and parameters are applied to safety testing to ensure correct interpretation of test results.
- 2.4 Visual checks of the cord connected apparatus and cord assemblies are carried out in accordance with established procedures to detect any abnormal or obvious damage or fault.
- 2.5 Approval is obtained in accordance with established procedures from appropriate personnel, before any contingencies are implemented.
- 2.6 Established PAT routines are followed to test cord connected apparatus and cord assemblies.
- 2.7 Unsafe cord connected apparatus and cord assemblies are identified from test results
- 2.8 Testing is undertaken effectively with minimum waste of energy and damage to apparatus.
- 3 Tag tested cord connected apparatus and cord assemblies and document testing activities
- 3.1 OHS work completion risk control measures and procedures are followed.
- 3.2 Work site is cleaned and made safe in accordance with established procedures.
- 3.3 Cord connected apparatus and cord assemblies are tagged according to their safety status.
- 3.4 Arrangements are made for unsafe cord connected apparatus and cord assemblies to be repaired by a recognised competent person.
- 3.5 Safety testing activities are documented in accordance with requirements and established routines procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and conduct in-service safety testing of electrical cord connected equipment and cord assemblies.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EP026A Testing and Tagging Portable and Cord Connected Electrical Apparatus

Evidence shall show an understanding of testing and tagging portable and cord connected electrical apparatus to an extent indicated by the following aspects:

T1 Australian Standards and Commonwealth/State/Territory legislation and regulations encompassing:

- Australian Standard AS/NZS 3760
- Commonwealth/State/Territory Occupational Health and Safety Acts and Regulations
- Limitations of work that can be undertaken
- Codes of Practice and associated guidance material
- Risk management principles

T2 Basic electrical testing concepts encompassing:

- Basic electrical circuits
- Functions of electrical circuit
- Conductors and insulators
- Basic electrical supply system
- Relationship of electrical quantities
- Effects of electrical currents
- Methods/devices used to negate or minimise electrical shock
- Portable Appliance Testers (PAT)
- PAT maintenance and calibration

T3 Electrical equipment and cord assemblies testing encompassing:

- Classification of electrical equipment
- Inspection of electrical equipment (visual inspections)
- Using PAT:
 - Earth continuity testing
 - Insulation resistance testing
 - Polarity testing (extension cords and IEC cords)

T4 Testing and tagging documentation requirements encompassing:

- Risk assessment documentation

REQUIRED SKILLS AND KNOWLEDGE

- frequency of inspection and testing
- tagging of equipment
- records maintenance

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing

assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Conduct in-service safety testing of electrical cord connected equipment and cord assemblies as described in 8) and including:

- a. Preparing the portable apparatus tester
- b. Connecting cords and apparatus to the testing apparatus
- c. Using test results to establish the safety status
- d. Identifying safe and unsafe cords and apparatus
- e. Applying appropriate tagging
- f. Documenting testing activities
- g. Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.
- Workplace evidence to be produced in an industry/regulator approved recording system (logbook) confirming skills development under appropriate supervision

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to conducting in-service safety testing of electrical cord connected equipment and cord assemblies.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to in-service safety testing of at least two different electrical cords and two different items of cord connected equipment with safety faults.

Safe Working. Safe procedures for working within in the scope of this unit shall be in accordance with AS/NZS 4836 'Safe working on low-voltage electrical installations.'

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Restricted and Specialisations

UEENEER001B Contribute to the planning of a research project

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the ability to gather background information relevant to a research project, understand the context of the research project and contribute to the development of a research plan to achieve quality outcomes.

Application of the Unit

Application of the Unit 4)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills 3)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Acquire and understand background information relevant to the Research project.	1.1 Information sources about the research topic are identified and evaluated for reliability and validity.
	1.2 Information about the consumer, product, market and competition is collected, reviewed and understood.
	1.3 Key clients/stakeholders, their views and interests, are identified and recorded.
	1.4 The context (industrial, legal, ethical, political) of the research project is identified and understood.
2 Understand the Logistics of a Research Project.	2.1 Client, stakeholder and organisational requirements are identified and understood.
	2.2 Contractual obligations of the project are identified and understood.
	2.3 Resources available to support the project are identified and understood.
	2.4 Quality standards for the project are identified and understood.
3 Contribute to the planning of a Research Project	3.1 Project objectives, methodology and strategies appropriate to the requirements and contractual obligations of the project are identified and selected, in a team environment.
	3.2 Project phases, milestones, reporting and review points are identified, in a team environment.
	3.3 Criteria for evaluating each project deliverable against pre-defined quality standards are developed, in a team environment.
	3.4 A Research Plan is developed, in a team environment.

ELEMENT**PERFORMANCE CRITERIA**

- | | | | |
|---|---|-----|---|
| 4 | Seek endorsement and ensure distribution of a Research Project Plan | 4.1 | The draft Research Plan is forwarded to clients/stakeholders/appropriate personnel for perusal and comment. |
| | | 4.2 | The draft Research Plan is amended to incorporate recommended improvements from clients/stakeholders/appropriate personnel. |
| | | 4.3 | The final Research Plan is confirmed against overall project deliverables by appropriate personnel. |
| | | 4.4 | The final Research Plan is distributed to all appropriate personnel and team members. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contribute to the planning of a research project.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ER001B Research project planning

Evidence shall show that knowledge has been acquired of safe working practices and contribute to the planning of a research project.

T1 Project planning encompassing:

- Purpose of project planning
- Documents needed to plan a project
- Factors influencing sequence and restraints of project activities
- Critical path analysis encompassing:
 - Graphical representation methods
 - Methods of representing time/rates

T2 Project management encompassing:

- Defining project parameters - Project scope; Project stakeholders and clients; Project phases and the relationship between phases; Time requirements and limitations; Resource requirements and limitations; Quality requirements and limitations.
- Time management - time management concepts; standard practices for ensuring a project runs to time and the like.
- Financial management - Financial management concepts; Standard practices for managing project finances; Project budgets; Costs, variations and estimations; Invoicing against project phases/deliverables; Acquittals and the like.
- Quality management - Quality management concepts; Standard practices for managing quality within a project.
- Human Resource management - human resource management concepts; standard practices for managing personnel within a project
- Communication management - Communication management concepts; Standard practices for managing communication within a project and the like.
- Risk management and contingencies - risk management concepts; standard practices for managing risk within a project; Internal risks; External risks; Risk minimisation; Risk removal; Contingencies and the like.

REQUIRED SKILLS AND KNOWLEDGE

- Procurement management - procurement management concepts; standard practices for managing procurement and the like.
- Physical Resource management - Types of physical resource, including; Equipment, Technology, Information, Facilities; Physical resource management concepts; Standard practices for managing physical resources
- Contracts - Understanding project contracts; Standard practices for working to contract specifications; Contract format; Contract content; Legal obligations of contract parties; Accompanying documentation including; Contract Schedules and the like.
- Performance assessment and continuous improvement - standard performance assessment practices; standard continuous improvement practices and the like
- Engineering ethics principles

T3 Research concepts encompassing:

- Terminology - Terminology used in a research workplace; Terminology used in research-specific literature and the like.
- Theory – why conduct research, The history of research; Past research successes; Past research failures; Research Protocols; Research practices and the like.
- The research environment - The research work environment; Standard research practices; Industrial, legal, ethical, political and market environment considerations; Legislation and regulation; Contractual obligations of all parties and the like.
- Planning to conduct research - Concept development and/or research brief analysis; Research objectives; Research deliverables; Research project plan; Literature reviews; Methodology development, including; Experimental design, Technology selection, Information Management system selection and the like
- Clients - Identifying client viewpoints and stake in project; Identifying client requirements and parameters; Determining research budgets, timelines, milestones and quality attributes with clients.
- Research, Development and Commercialisation - Research and Development goals versus Commercialisation goals and realities; Research and Development to inspire a commercialisation process.

T4 Work in a team encompassing:

- Types of teams - Managerial, Administrative, Project-based, Commercial and Social
- Roles, responsibilities and accountabilities of team members - the role, responsibility and accountability of individuals, teams, organisational management, clients and the like.
- Working in a team - Identification and utilisation of team member skills and knowledge; Maximising benefits of team diversity; Team planning; Team commitment and cooperation; Improving/Maximising team performance to achieve goals; Team monitoring and adjustment; Plain English literacy and communication; Leading, facilitating, participating, coaching, mentoring.
- Working with clients - client relations, client liaison, the practice of working with

REQUIRED SKILLS AND KNOWLEDGE

clients and the like.

- Conflict resolution – Personality analysis tools, Strategies for dealing with difficult people and the like.

T5 Scientific writing and communication encompassing:

- Types of scientific writing and communication - The distinguishing characteristics of the different types of scientific writing.
- Purpose of the different types of scientific writing - Product development justification and specifications; Management advice; Scientific papers/publications; Conference/meeting presentations; Policy documents; Planning documents; Reports and the like.
- Types of audience - The features and characteristics of an audience, including; an audience's professional, social, cultural, ethnic background and physical and academic capabilities; the importance of 'Plain English' written and oral communication.
- Scientific writing techniques - The component parts of scientific documents, including: Aim, Materials, Method, Results, Discussion, Conclusion, References; The required content of each component part; Scientific referencing techniques, including: Bibliographies, Reference Lists, Citations, Footnotes, Quotes, and Acknowledgements; Scientific labelling techniques, including: Graphs, Tables, Diagrams, and Figures; Techniques for documenting results, including: Text, Graphs, Tables, Diagrams, and Figures; Organisational standards for document and presentation production, including: Standard organisational document templates, letterheads, headers, footers, and logos.
- Oral communication techniques - Techniques for communicating to large groups, including; Conference presentations, Speeches; Techniques for communicating to small groups, including: Meeting presentations, Team discussions, planning forums and the like.
- Electronic communication formats - World-wide Web – protocols and practices; Email – protocols and practices; Transfer of information via CD Rom/Floppy Disk; Use of PDF and other secure files.
- Confidentiality considerations - Confidentiality practices to protect the organisation; Confidentiality practices to protect the client; Confidentiality practices to protect providers of information/research cohorts.

T6 Data collection techniques encompassing:

- Data types - Quantitative data, including; empirical, non-parametric, parametric; Qualitative data; Raw; Graphic; Diagrams; Original; Textual; Multimedia; Electronic and the like.
- Data Collection - Data sources; Consultation protocols and practices; Survey methodologies, including; interviews, surveys, chat rooms, focus groups; Literature reviews, including; traditional and web-based; Group facilitation and presentation; Questioning, active listening and clarification; Obstacles to data collection, including; unavailable data, inconsistent data, confidentiality, security; Data limitations.

REQUIRED SKILLS AND KNOWLEDGE

- Evaluating data quality - Reliability; Accuracy; Clarity; Validity; Contribution to research; Relevance to research objectives.

T7 Data analysis and presentation encompassing:

- Data analysis techniques - Univariate analysis; Multivariate analysis; Decision trees; Genetic Algorithms; Neural Networks; Gap Analysis; Urgency and impact, and the like.
- Data analysis technique selection - Determining the correct analysis technique(s); Determining the correct sequence of analysis techniques; Accommodating influencing factors including research objectives, budget, timeline and quality requirements, data limitations, confidentiality, security and the like.
- Data interpretation - Determining results; determining conclusions; Benchmarking; Quality Assurance, including consideration of accuracy, validity, clarity and the like.
- Data presentation:
 - Determining the correct form of presentation for the audience, including; colleagues, scientific community, marketing and commercialisation specialists, general community, industry, mixed (i.e. conference audience).
 - Forms of documentary presentation, including reports, journal articles, scientific papers, graphs, tables, diagrams, electronic formats; Forms of verbal presentation, including meetings, client briefings, conferences, support of a new concept, need for further research, commercialisation opportunity; Quality Assurance, including accuracy, validity, clarity of information presented.

T8 Product development and trials encompassing:

- Identifying client and managerial requirements for production and trials - Required outcome(s); Key performance indicators; Timelines; Financing; Resources; Quality Assurance and the like.
- Influencing factors - Internal business goals and strategies; Technical specifications (chemical, mechanical, environmental); Industrial considerations; Regulatory considerations; Legislative considerations; Intellectual Property; Australian & International Standards; Codes of Practice; Market requirements; Resource requirements, including personnel tools and equipment (principles and practices), materials, finances and the like.
- Product development arrangements - Licensing agreements; Joint Ventures; Sole Ventures and the like.
- Relevant Documentation - Codes of Practice; Standard Operating Procedures; Product formulation documentation; Material safety data sheets (MSDSs); Equipment and Quality manuals; Calibration and maintenance schedules; Enterprise recording and reporting procedures; Material, equipment and product specifications and the like.
- Development & trial processes - Proof of concept; Trialing concepts; Definitions/Specifications; Types of development and trial processes, including Phase A product and trial, Phase B product and trial, User trials, Ergonomics and Usability testing; Pre-defined acceptance criteria, confidence limits; Data

REQUIRED SKILLS AND KNOWLEDGE

collection & analysis; Production; Evaluation and recommendation formulation.

T9 Intellectual property concepts encompassing:

- Intellectual Property and Australian Law - The place of Intellectual Property in Australian Law; Past cases and outcomes; Necessary considerations and the like.
- The nature of Intellectual Property - What is Intellectual Property? What isn't Intellectual Property?; Why is Intellectual Property relevant?; What can Intellectual Property rights do?; What can't Intellectual Property rights do?
- Intellectual Property Rights - Patents; Copyright; Designs; Confidential Information; Other specialty rights and the like.
- Managing Intellectual Property - Identifying Intellectual Property; Deciding what to protect; Strategies for managing Intellectual Property; How can Intellectual Property rights work together?; Intellectual Property versus time, effort, finances; Sources of Assistance, including Publications, Intellectual Property professionals, Lawyers, Business Advisors, Marketing consultants and the like.
- Enforcement of Intellectual Property - The enforcement process; The role of lawyers; Resolution.
- The changing face of Intellectual Property - Development of Intellectual Property Right Laws; Changes to Intellectual Property Right laws; Extensions of Intellectual Property Rights into non-traditional areas, including cultural, property arenas; The global marketplace and the like.

T10 Commercialisation concepts encompassing:

- Commercialisation - Definition of commercialisation; Triggers for commercialisation; Past commercialisation successes; Past commercialisation failures; Triggers for commercialisation; Methods for identifying a good product/idea/service/application; Sources of assistance in regard to commercialisation, including documents; lawyers, business advisors, marketing consultants.
- The commercialisation process - The concept; Does the concept fit with the organisation's goals? Is there a market, what is the market? Will the product meet the market requirements? Can the product be sold? How can the product be sold? Can the product be produced? How can the product be produced? Can the production be repeated?
- Commercialisation arrangements - sole venture; Joint venture; Licensing; Legal aspects of commercialisation.
- Commercialisation planning - Costing; Marketing; Production/development; Distribution; Sales.
- Competition - Who are the competitors? What are they doing and how quickly? Internal development relevant to competition.
- Critical analysis of the commercialisation process for continuous improvement - Successes; Opportunities for improvement; Controllable influences; Uncontrollable influences; Formulation of recommendations.

T11 Occupational Health and Safety principles and fundamentals encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- underlying principles of OH&S
- general aims and objectives of the relevant state or territory legislation relating to OH&S.
- employer and employee responsibilities, rights and obligations.
- major functions of safety committees and representatives.
- powers given to Occupational Health and Safety Inspectors
- housekeeping and potential hazards in relation to improper housekeeping
- selecting appropriate personal protective equipment (PPE) given hazardous situations

T12 The work environment encompassing:

- typical hazards associated with a range of work environments
- procedures used to control the risks associated with these hazards
- principles of risk assessment / management and state the purpose of each.
- hierarchy of OH&S hazard control measures.
- required documentation for risk assessment.
- commonly used workplace safety signs.
- workplace emergencies that pose a threat to health and safety and suitable procedure for an emergency workplace evacuation.
- appropriate fire extinguisher for a given type of fire.
- requirements for the location, mounting and maintenance of portable fire extinguishers.
- basic process of fighting a fire.
- safe premises, buildings and security are important in an industrial setting and the consequences of non- compliance with these.
- standard work procedure is and why they are required in some circumstances.

T13 Manual Handling encompassing:

- typical manual handling injuries and the effect they can have on lifestyle
- situations that may cause manual handling injuries
- correct procedures for lifting and carrying to prevent manual handling injuries
- Chemicals in the workplace encompassing:
 - hazardous substances and dangerous goods.
 - Classification of chemicals as hazardous substances and/or dangerous goods
 - requirements for labelling of chemicals in the workplace
 - safe storage procedures for chemicals
 - purpose of and interpretation of material safety data sheet (MSDS)

T14 Working at heights encompassing:

- dangers associated with working on ladders and scaffolds
- identification of work area as a height risk and use appropriate safety equipment to prevent a fall
- selecting an appropriate ladder for a given situation and perform a safety check

REQUIRED SKILLS AND KNOWLEDGE

before use

- precautions that should be taken when ascending and working off a ladder
- precautions that should be taken when working on and around a scaffold and elevated platforms.

T15 Confined spaces encompassing:

- hazards associated with working in a confined space
- identifying workplace situations that could be classified as a confined space
- control measures for working in a designated confined space

T16 Physical and psychological hazards encompassing:

- short and long term effects of excessive noise and techniques to avoid damage to hearing due to excessive noise
- effects of vibration on the human body and work practices to protect against vibration
- effects of thermal stress on the human body and work practices to protect against thermal stress
- effects of ultraviolet (UV) radiation on the human body and work practices to protect against UV radiation.
- dangers associated with laser operated equipment and tools and suitable protective measures to overcome the danger.
- occupational overuse syndrome, state examples of how it occurs and describe means to overcome it
- factors that cause stress in the workplace, symptoms of a person suffering from stress and personal stress management techniques
- detrimental effects and dangers of drug and alcohol use in the workplace

T17 Working safely with electricity encompassing:

- effects of electric shock on the human body
- common causes of electrical accidents
- precautions that can minimise the chance of electric shock (earthing, extra low voltage, fuses, circuit breakers and residual current devices – RCDs)
- protection offered by a residual current device (RCD)
- need for ensuring the (safe) isolation of an electrical supply
- appropriate method of removing an electric shock victim from a live electrical situation

T18 Life support - CPR in the workplace encompassing:

- First Aid.
- responsibilities of the First Aider.
- priorities of first aid management for any accident or injury.
- procedures required at an accident scene.
- legal and ethical issues, which may impact on the management of care.
- 'Duty of Care'.

REQUIRED SKILLS AND KNOWLEDGE

- examination of a casualty for injuries.
- effect of cardio pulmonary arrest on the body.
- Managing simulated conditions of: airway obstruction; respiratory arrest and cardio pulmonary arrest,
- single and two-person cardio pulmonary resuscitation (CPR).
- signs and symptoms of an altered level of consciousness
- management of simulation of a casualty with an altered level of consciousness.
- signs and symptoms of shock.
- management of simulation of a casualty in shock

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity,

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electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Contribute to the planning of a research project as described in 8) and including:
 - A Demonstrating consistent performance for each Element of the unit
 - B Meeting the performance criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace
 - C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled 'Essential knowledge and associated skills'.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to contributing to the planning of a research project.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

BSXFM1504A Participate in, lead and facilitate work teams

UEENEER002B Contribute to the conduct of a research project

UEENEER003B Contribute to the development of a

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	product/application/service
UEENEER004B	Contribute to the trial of a product/application/service
UEENEER005B	Contribute to intellectual property management
BSBCM306A	Produce business documents
BSBSBM405A	Monitor and manage business operations
UEENEER00A	Contribute to the commercialisation of a product/application/service
PMBQUAL309 A	Solve problems using 'quality tools'

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the planning of research projects. Typically this work is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. It generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the research process.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter to be researched.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Standard Operating Procedures
- Resources

The following constants and variables included in the Element/performance criteria in this unit are fully described in the Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading 5 Writing 5 Numeracy 5

Custom Content Section

Competency Field 5)
Research

UEENEER002B Contribute to the conduct of a research project

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the ability to identify information sources and collect and analyse information in accordance with confirmed research project objectives and compile and present results in accordance with current business practices.

Application of the Unit

Application of the Unit 4)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills 3)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Confirm research parameters	1.1 Consultation with appropriate personnel is undertaken to ensure that the scope, objectives and expected outcomes of the research are understood.
	1.2 Timeframes, available resources, budget and quality standards for the research are confirmed and understood.
	1.3 The research methodology and strategies are confirmed and understood.
2 Identify sources and availability of information	2.1 The type and range of information required is clearly identified to meet research objectives.
	2.2 Information sources are identified and evaluated for their contribution to the research.
	2.3 Protocols and other procedures required to access information are clearly identified and appropriate action taken.
	2.4 Limitations on the availability of material are identified and appropriate action taken.
	2.5 Obstacles to the collection of information are identified and appropriate action taken.
3 Collect information to achieve research objectives	3.1 Information collection methods are applied correctly and consistently, in accordance with appropriate procedures and agreements reached with information sources.
	3.2 The types and range of information collected are in line with the research objectives.
	3.3 Information is recorded accurately and clearly in an appropriate format.
4 Analyse and compile research information	4.1 Methods of analysis and compilation are appropriate to the information collected and objectives of the research.
	4.2 Methodologies and procedures incorporate current technological developments and meet

ELEMENT	PERFORMANCE CRITERIA
	relevant industry standards.
	4.3 Results are obtained within the specified time, budget and quality constraints.
	4.4 Results are recorded accurately and clearly in appropriate format.
	4.5 Results are carefully interpreted and conclusions drawn.
	4.6 The results and conclusions are reviewed with appropriate personnel.
5 Present research results and conclusions.	5.1 A report/summary/presentation detailing the research results and conclusions is developed in accordance with current business practices.
	5.2 Confidential information is protected in accordance with predefined agreements and/or procedures.
	5.3 All sources of information are accurately acknowledged or cited in a recognised and appropriate format.
	5.4 The success of the research methodology is evaluated against the research objectives.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the conduct of a research project.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ER002B Conducting Research Projects

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the conducting of a research project.

T1 Project planning

- Purpose of project planning
- Documents needed to plan a project
- Factors influencing sequence and restraints of project activities
- Critical path analysis encompassing:
 - Graphical representation methods
 - Methods of representing time/rates

T2 Research concepts encompassing:

- Terminology - Terminology used in a research workplace; Terminology used in research-specific literature and the like.
- Theory – why conduct research, The history of research; Past research successes; Past research failures; Research Protocols; Research practices and the like.
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REQUIRED SKILLS AND KNOWLEDGE

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- Types of audience - The features and characteristics of an audience, including; an audience's professional, social, cultural, ethnic background and physical and academic capabilities; the importance of 'Plain English' written and oral communication.
- Scientific writing techniques - The component parts of scientific documents, including: Aim, Materials, Method, Results, Discussion, Conclusion, References; The required content of each component part; Scientific referencing techniques, including: Bibliographies, Reference Lists, Citations, Footnotes, Quotes, and Acknowledgements; Scientific labelling techniques, including: Graphs, Tables, Diagrams, and Figures; Techniques for documenting results, including: Text, Graphs, Tables, Diagrams, and Figures; Organisational standards for document and presentation production, including: Standard organisational document templates, letterheads, headers, footers, and logos.
- Oral communication techniques - Techniques for communicating to large groups, including; Conference presentations, Speeches; Techniques for communicating to small groups, including: Meeting presentations, Team discussions, planning forums and the like.
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REQUIRED SKILLS AND KNOWLEDGE

organisation; Confidentiality practices to protect the client; Confidentiality practices to protect providers of information/research cohorts.

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- Data Collection - Data sources; Consultation protocols and practices; Survey methodologies, including; interviews, surveys, chat rooms, focus groups; Literature reviews, including; traditional and web-based; Group facilitation and presentation; Questioning, active listening and clarification; Obstacles to data collection, including; unavailable data, inconsistent data, confidentiality, security; Data limitations.
- Evaluating data quality - Reliability; Accuracy; Clarity; Validity; Contribution to research; Relevance to research objectives.

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- Data interpretation - Determining results; determining conclusions; Benchmarking; Quality Assurance, including consideration of accuracy, validity, clarity and the like.
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 - Determining the correct form of presentation for the audience, including; colleagues, scientific community, marketing and commercialisation specialists, general community, industry, mixed (i.e. conference audience).
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- Influencing factors - Internal business goals and strategies; Technical specifications (chemical, mechanical, environmental); Industrial considerations; Regulatory considerations; Legislative considerations; Intellectual Property; Australian & International Standards; Codes of Practice; Market requirements;

REQUIRED SKILLS AND KNOWLEDGE

Resource requirements, including personnel tools and equipment (principles and practices), materials, finances and the like.

- Product development arrangements - Licensing agreements; Joint Ventures; Sole Ventures and the like.
- Relevant Documentation - Codes of Practice; Standard Operating Procedures; Product formulation documentation; Material safety data sheets (MSDSs); Equipment and Quality manuals; Calibration and maintenance schedules; Enterprise recording and reporting procedures; Material, equipment and product specifications and the like.
- Development & trial processes - Proof of concept; trialing concepts; Definitions/Specifications; Types of development and trial processes, including Phase A product and trial, Phase B product and trial, User trials, Ergonomics and Usability testing; Pre-defined acceptance criteria, confidence limits; Data collection & analysis; Production; Evaluation and recommendation formulation.

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- Intellectual Property Rights - Patents; Copyright; Designs; Confidential Information; Other specialty rights and the like.
- Managing Intellectual Property - Identifying Intellectual Property; Deciding what to protect; Strategies for managing Intellectual Property; How can Intellectual Property rights work together?; Intellectual Property versus time, effort, finances; Sources of Assistance, including Publications, Intellectual Property professionals, Lawyers, Business Advisors, Marketing consultants and the like.
- Enforcement of Intellectual Property - The enforcement process; The role of lawyers; Resolution.
- The changing face of Intellectual Property - Development of Intellectual Property Right Laws; Changes to Intellectual Property Right laws; Extensions of Intellectual Property Rights into non-traditional areas, including cultural, property arenas; The global marketplace and the like.

T9 Occupational Health and Safety principles and fundamentals encompassing:

- underlying principles of OH&S
- general aims and objectives of the relevant state or territory legislation relating to OH&S.
- employer and employee responsibilities, rights and obligations.
- major functions of safety committees and representatives.
- powers given to Occupational Health and Safety Inspectors
- housekeeping and potential hazards in relation to improper housekeeping
- selecting appropriate personal protective equipment (PPE) given hazardous

REQUIRED SKILLS AND KNOWLEDGE

situations

T10 The work environment encompassing:

- typical hazards associated with a range of work environments
- procedures used to control the risks associated with these hazards
- principles of risk assessment / management and state the purpose of each.
- hierarchy of OH&S hazard control measures.
- required documentation for risk assessment.
- commonly used workplace safety signs.
- workplace emergencies that pose a threat to health and safety and suitable procedure for an emergency workplace evacuation.
- appropriate fire extinguisher for a given type of fire.
- requirements for the location, mounting and maintenance of portable fire extinguishers.
- basic process of fighting a fire.
- safe premises, buildings and security are important in an industrial setting and the consequences of non-compliance with these.
- standard work procedure is and why they are required in some circumstances.

T11 Manual Handling encompassing:

- typical manual handling injuries and the effect they can have on lifestyle
- situations that may cause manual handling injuries
- correct procedures for lifting and carrying to prevent manual handling injuries
- Chemicals in the workplace encompassing:
 - hazardous substances and dangerous goods.
 - Classification of chemicals as hazardous substances and/or dangerous goods
 - requirements for labelling of chemicals in the workplace
 - safe storage procedures for chemicals
 - purpose of and interpretation of material safety data sheet (MSDS)

T12 Working at heights encompassing:

- dangers associated with working on ladders and scaffolds
- identification of work area as a height risk and use appropriate safety equipment to prevent a fall
- selecting an appropriate ladder for a given situation and perform a safety check before use
- precautions that should be taken when ascending and working off a ladder
- precautions that should be taken when working on and around a scaffold and elevated platforms.

T13 Confined spaces encompassing:

- hazards associated with working in a confined space
- identifying workplace situations that could be classified as a confined space

REQUIRED SKILLS AND KNOWLEDGE

- control measures for working in a designated confined space

T14 Physical and psychological hazards encompassing:

- short and long term effects of excessive noise and techniques to avoid damage to hearing due to excessive noise
- effects of vibration on the human body and work practices to protect against vibration
- effects of thermal stress on the human body and work practices to protect against thermal stress
- effects of ultraviolet (UV) radiation on the human body and work practices to protect against UV radiation.
- dangers associated with laser operated equipment and tools and suitable protective measures to overcome the danger.
- occupational overuse syndrome, state examples of how it occurs and describe means to overcome it
- factors that cause stress in the workplace, symptoms of a person suffering from stress and personal stress management techniques
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T15 Working safely with electricity encompassing:

- effects of electric shock on the human body
- common causes of electrical accidents
- precautions that can minimise the chance of electric shock (earthing, extra low voltage, fuses, circuit breakers and residual current devices – RCDs)
- protection offered by a residual current device (RCD)
- need for ensuring the (safe) isolation of an electrical supply
- appropriate method of removing an electric shock victim from a live electrical situation

T16 Life support - CPR in the workplace encompassing:

- First Aid.
- responsibilities of the First Aider.
- priorities of first aid management for any accident or injury.
- procedures required at an accident scene.
- legal and ethical issues, which may impact on the management of care.
- 'Duty of Care'.
- examination of a casualty for injuries.
- effect of cardio pulmonary arrest on the body.
- Managing simulated conditions of: airway obstruction; respiratory arrest and cardio pulmonary arrest,
- single and two-person cardio pulmonary resuscitation (CPR).
- signs and symptoms of an altered level of consciousness
- management of simulation of a casualty with an altered level of consciousness.

REQUIRED SKILLS AND KNOWLEDGE

- signs and symptoms of shock.
- management of simulation of a casualty in shock

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are

EVIDENCE GUIDE

more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Contribute to the conduct of a research project as described in 8) and including:
 - A Demonstrating consistent performance for each Element of the unit

EVIDENCE GUIDE

- B Meeting the performance criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace
- C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled 'Essential knowledge and associated skills'.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to contributing to the conduct of a research project.

EVIDENCE GUIDE**Method of assessment****9.4)**

This unit shall be assessed by methods outlined in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units**9.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

BSXFM1504A Participate in, lead and facilitate work teams

UEENEER001B Contribute to the planning of a research project

UEENEER003B Contribute to the development of a product/application/service

UEENEER004B Contribute to the trial of a product/application/service

UEENEER005B Contribute to intellectual property management

BSBCM306A Produce business documents

BSBSBM405A Monitor and manage business operations

UEENEER006B Contribute to the commercialisation of a product/application/service

PMBQUAL309 Solve problems using 'quality tools'
A

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the planning of research projects. Typically this work is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. It generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the research process.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter to be researched.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Standard Operating Procedures
- Resources

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5
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2.2) Literacy and numeracy skills

Competency Field 5)

Research

UEENEER003B Contribute to the development of a product/application/ service

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the ability to assist managers to plan, coordinate and report on the development of a product/application/service.

Application of the Unit

Application of the Unit 4)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills 3)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Contribute to the development of a design brief for a product/service/application.	1.1 Technical specifications, regulatory, industrial, intellectual property and market requirements of the product/application/service to be developed are negotiated with client(s), stakeholders and management and agreed on.
	1.2 Technical specifications, regulatory, industrial, intellectual property and market requirements of the product/application/service to be developed are confirmed.
	1.3 Resource requirements, including personnel, equipment and materials needed to develop the product/application/service area confirmed.
	1.4 Quality requirements and standards for development of the product/application/service are confirmed.
	1.5 A design brief for the product/application/service is developed in a team environment.
	1.6 Approval is obtained for the design brief from appropriate personnel.
2 Prepare to develop a product/application/service	2.1 The required outcome(s) as identified in design brief is confirmed with appropriate personnel.
	2.2 The product/application/service is developed in consultation with appropriate production personnel.
	2.3 A development procedure is formulated to: <ul style="list-style-type: none">- deliver required quality outcome(s)- ensure OHS, environmental, industrial and regulatory requirements are stringently observed- ensure tooling, process, materials and equipment specifications are addressed
	2.4 Approval is obtained of the development procedure from appropriate personnel.

ELEMENT	PERFORMANCE CRITERIA
3 Contribute to the development of a product/application/service	3.1 The development procedure is confirmed with appropriate personnel.
	3.2 A product/application/ service product is developed in accordance with the design brief and development procedure.
	3.3 Development results are recorded in accordance with enterprise procedures.
	3.4 Develop results and identify characteristics which are outside design and development specifications are identified.
	3.5 Changes are recommended, as necessary, to achieve product/application/ service quality and production requirements.
	3.6 Approval of changes is obtained from appropriate personnel.
	3.7 Revision of the product/ application/service to achieve quality and production requirements is coordinated where necessary.
4 Document and report product/application/service development outcomes	4.1 All product/application/service development objectives are met.
	4.2 Product/application/service development reporting requirements are completed.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the development of a product/application/service.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ER003B Product/application/service development

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the development of a product/application/service.

T1 Project planning

- Purpose of project planning
- Documents needed to plan a project
- Factors influencing sequence and restraints of project activities
- Critical path analysis encompassing:
 - Graphical representation methods
 - Methods of representing time/rates

T2 Project management encompassing:

- Defining project parameters - Project scope; Project stakeholders and clients; Project phases and the relationship between phases; Time requirements and limitations; Resource requirements and limitations; Quality requirements and limitations.
- Time management - time management concepts; standard practices for ensuring a project runs to time and the like.
- Financial management - Financial management concepts; Standard practices for managing project finances; Project budgets; Costs, variations and estimations; Invoicing against project phases/deliverables; Acquittals and the like.
- Quality management - Quality management concepts; Standard practices for managing quality within a project.
- Human Resource management - human resource management concepts; standard practices for managing personnel within a project
- Communication management - Communication management concepts; Standard practices for managing communication within a project and the like.
- Risk management and contingencies - risk management concepts; standard practices for managing risk within a project; Internal risks; External risks; Risk minimisation; Risk removal; Contingencies and the like.

REQUIRED SKILLS AND KNOWLEDGE

- Procurement management - procurement management concepts; standard practices for managing procurement and the like.
- Physical Resource management - Types of physical resource, including; Equipment, Technology, Information, Facilities; Physical resource management concepts; Standard practices for managing physical resources
- Contracts - Understanding project contracts; Standard practices for working to contract specifications; Contract format; Contract content; Legal obligations of contract parties; Accompanying documentation including; Contract Schedules and the like.
- Performance assessment and continuous improvement - standard performance assessment practices; standard continuous improvement practices and the like
- Engineering ethics principles

T3 Work in a team encompassing:

- Types of teams - Managerial, Administrative, Project-based, Commercial and Social
- Roles, responsibilities and accountabilities of team members - the role, responsibility and accountability of individuals, teams, organisational management, clients and the like.
- Working in a team - Identification and utilisation of team member skills and knowledge; Maximising benefits of team diversity; Team planning; Team commitment and cooperation; Improving/Maximising team performance to achieve goals; Team monitoring and adjustment; Plain English literacy and communication; Leading, facilitating, participating, coaching, mentoring.
- Working with clients - client relations, client liaison, the practice of working with clients and the like.
- Conflict resolution – Personality analysis tools, Strategies for dealing with difficult people and the like.

T4 Scientific writing and communication encompassing:

- Types of scientific writing and communication - The distinguishing characteristics of the different types of scientific writing.
- Purpose of the different types of scientific writing - Product development justification and specifications; Management advice; Scientific papers/publications; Conference/meeting presentations; Policy documents; Planning documents; Reports and the like.
- Types of audience - The features and characteristics of an audience, including; an audience's professional, social, cultural, ethnic background and physical and academic capabilities; the importance of 'Plain English' written and oral communication.
- Scientific writing techniques - The component parts of scientific documents, including: Aim, Materials, Method, Results, Discussion, Conclusion, References; The required content of each component part; Scientific referencing techniques, including: Bibliographies, Reference Lists, Citations, Footnotes, Quotes, and Acknowledgements; Scientific labelling techniques, including: Graphs, Tables,

REQUIRED SKILLS AND KNOWLEDGE

Diagrams, and Figures; Techniques for documenting results, including: Text, Graphs, Tables, Diagrams, and Figures; Organisational standards for document and presentation production, including: Standard organisational document templates, letterheads, headers, footers, and logos.

- Oral communication techniques - Techniques for communicating to large groups, including; Conference presentations, Speeches; Techniques for communicating to small groups, including: Meeting presentations, Team discussions, planning forums and the like.
- Electronic communication formats - World-wide Web – protocols and practices; Email – protocols and practices; Transfer of information via CD Rom/Floppy Disk; Use of PDF and other secure files.
- Confidentiality considerations - Confidentiality practices to protect the organisation; Confidentiality practices to protect the client; Confidentiality practices to protect providers of information/research cohorts.

T5 Data collection techniques encompassing:

- Data types - Quantitative data, including; empirical, non-parametric, parametric; Qualitative data; Raw; Graphic; Diagrams; Original; Textual; Multimedia; Electronic and the like.
- Data Collection - Data sources; Consultation protocols and practices; Survey methodologies, including; interviews, surveys, chat rooms, focus groups; Literature reviews, including; traditional and web-based; Group facilitation and presentation; Questioning, active listening and clarification; Obstacles to data collection, including; unavailable data, inconsistent data, confidentiality, security; Data limitations.
- Evaluating data quality - Reliability; Accuracy; Clarity; Validity; Contribution to research; Relevance to research objectives.

T6 Data analysis and presentation encompassing:

- Data analysis techniques - Univariate analysis; Multivariate analysis; Decision trees; Genetic Algorithms; Neural Networks; Gap Analysis; Urgency and impact, and the like.
- Data analysis technique selection - Determining the correct analysis technique(s); Determining the correct sequence of analysis techniques; Accommodating influencing factors including research objectives, budget, timeline and quality requirements, data limitations, confidentiality, security and the like.
- Data interpretation - Determining results; determining conclusions; Benchmarking; Quality Assurance, including consideration of accuracy, validity, clarity and the like.
- Data presentation:
 - Determining the correct form of presentation for the audience, including; colleagues, scientific community, marketing and commercialisation specialists, general community, industry, mixed (i.e. conference audience).
 - Forms of documentary presentation, including reports, journal articles, scientific papers, graphs, tables, diagrams, electronic formats; Forms of verbal

REQUIRED SKILLS AND KNOWLEDGE

presentation, including meetings, client briefings, conferences, support of a new concept, need for further research, commercialisation opportunity; Quality Assurance, including accuracy, validity, clarity of information presented.

T7 Product development and trials encompassing:

- Identifying client and managerial requirements for production and trials - Required outcome(s); Key performance indicators; Timelines; Financing; Resources; Quality Assurance and the like.
- Influencing factors - Internal business goals and strategies; Technical specifications (chemical, mechanical, environmental); Industrial considerations; Regulatory considerations; Legislative considerations; Intellectual Property; Australian & International Standards; Codes of Practice; Market requirements; Resource requirements, including personnel tools and equipment (principles and practices), materials, finances and the like.
- Product development arrangements - Licensing agreements; Joint Ventures; Sole Ventures and the like.
- Relevant Documentation - Codes of Practice; Standard Operating Procedures; Product formulation documentation; Material safety data sheets (MSDSs); Equipment and Quality manuals; Calibration and maintenance schedules; Enterprise recording and reporting procedures; Material, equipment and product specifications and the like.
- Development & trial processes - Proof of concept; Trialing concepts; Definitions/Specifications; Types of development and trial processes, including Phase A product and trial, Phase B product and trial, User trials, Ergonomics and Usability testing; Pre-defined acceptance criteria, confidence limits; Data collection & analysis; Production; Evaluation and recommendation formulation.

T8 Intellectual property concepts encompassing:

- Intellectual Property and Australian Law - The place of Intellectual Property in Australian Law; Past cases and outcomes; Necessary considerations and the like.
- The nature of Intellectual Property - What is Intellectual Property? What isn't Intellectual Property?; Why is Intellectual Property relevant?; What can Intellectual Property rights do?; What can't Intellectual Property rights do?
- Intellectual Property Rights - Patents; Copyright; Designs; Confidential Information; Other specialty rights and the like.
- Managing Intellectual Property - Identifying Intellectual Property; Deciding what to protect; Strategies for managing Intellectual Property; How can Intellectual Property rights work together?; Intellectual Property versus time, effort, finances; Sources of Assistance, including Publications, Intellectual Property professionals, Lawyers, Business Advisors, Marketing consultants and the like.
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- responsibilities of the First Aider.
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REQUIRED SKILLS AND KNOWLEDGE

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- legal and ethical issues, which may impact on the management of care.
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EVIDENCE GUIDE

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EVIDENCE GUIDE

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 - A Demonstrating consistent performance for each Element of the unit
 - B Meeting the performance criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace
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Note:

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EVIDENCE GUIDE

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9.3)

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- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to contributing to the development of a product/application/service.

Method of assessment

9.4)

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Note:

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9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

BSXFM1504A Participate in, lead and facilitate work teams

UEENEER001B Contribute to the planning of a research project

UEENEER002B Conduct to the conduct of a research project

EVIDENCE GUIDE

- UEENEER004B Contribute to the trial of a product/application/service
- UEENEER005B Contribute to intellectual property management
- BSBCM306A Produce business documents
- BSBSBM405A Monitor and manage business operations
- UEENEER006B Contribute to the commercialisation of a product/application/service
- PMBQUAL309 Solve problems using 'quality tools'
A

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the development of a product/application/service.

Product/application/service design and development briefs may be provided by external and/or internal clients.

Typically the work covered by this unit is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. This generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the product/application/service being developed.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter to be researched.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Resources, which may be subject to negotiation

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5
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2.2) Literacy and numeracy skills

Competency Field 5)

Research

UEENEER004B Contribute to the trial of a product/application/ service

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor

1)

1.1) Descriptor

This unit covers the ability to assist the manager's plan, coordinate and report on a product/application/service trial.

Application of the Unit

Application of the Unit 4)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) 2)

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills 3)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Acquire and understand background information relevant to the trial of the product/application/service.	1.1 Information sources about the research topic are identified and evaluated for reliability and validity.
	1.2 Information about the consumer, product, market and competition is collected, reviewed and understood.
	1.3 Key clients/stakeholders and their particular views and interests are identified and recorded.
	1.4 The context (industrial, legal, ethical, political etc) of the research project is identified and understood.
2 Understand the logistics of a trial of a product, application and/or service	2.1 Client, stakeholder and organisational requirements are identified and understood.
	2.2 Contractual obligations of the project are identified and understood.
	2.3 Resources available to support the project are identified and understood.
	2.4 Quality standards for the project are identified and understood.
3 Contribute to the trial of a product, application and/or service	3.1 Project objectives, methodology and strategies appropriate to the requirements and contractual obligations of the project are identified and selected in a team environment.
	3.2 Project phases, milestones, reporting and review points are identified in a team environment.
	3.3 Criteria for evaluating each project deliverable against predefined quality standards are developed in a team environment.
	3.4 A Research Plan is developed in a team environment.

ELEMENT**PERFORMANCE CRITERIA**

- | | | | |
|---|--|-----|--|
| 4 | Seek endorsement and ensure distribution of a trial of a product, application and/or service | 4.1 | The draft Research Plan is forwarded to clients/stakeholders/ appropriate personnel for perusal and comment. |
| | | 4.2 | The draft Research Plan is amended to incorporate recommended improvements from clients/stakeholders/appropriate personnel |
| | | 4.3 | The final Research Plan is confirmed against overall project deliverables by appropriate personnel. |
| | | 4.4 | The final Research Plan is distributed to all appropriate personnel and team members. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the trial of a product/application/service.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ER004B Product/application/service trials

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the trial of a product/application/service.

T1 Project planning

- Purpose of project planning
- Documents needed to plan a project
- Factors influencing sequence and restraints of project activities
- Critical path analysis encompassing:
 - Graphical representation methods
 - Methods of representing time/rates

T2 Research concepts encompassing:

- Terminology - Terminology used in a research workplace; Terminology used in research-specific literature and the like.
- Theory – why conduct research, The history of research; Past research successes; Past research failures; Research Protocols; Research practices and the like.
- The research environment - The research work environment; Standard research practices; Industrial, legal, ethical, political and market environment considerations; Legislation and regulation; Contractual obligations of all parties and the like.
- Planning to conduct research - Concept development and/or research brief analysis; Research objectives; Research deliverables; Research project plan; Literature reviews; Methodology development, including; Experimental design, Technology selection, Information Management system selection and the like
- Clients - Identifying client viewpoints and stake in project; Identifying client requirements and parameters; Determining research budgets, timelines, milestones and quality attributes with clients.
- Research, Development and Commercialisation - Research and Development goals versus Commercialisation goals and realities; Research and Development to inspire a commercialisation process.

REQUIRED SKILLS AND KNOWLEDGE

T3 Work in a team encompassing:

- Types of teams - Managerial, Administrative, Project-based, Commercial and Social
- Roles, responsibilities and accountabilities of team members - the role, responsibility and accountability of individuals, teams, organisational management, clients and the like.
- Working in a team - Identification and utilisation of team member skills and knowledge; Maximising benefits of team diversity; Team planning; Team commitment and cooperation; Improving/Maximising team performance to achieve goals; Team monitoring and adjustment; Plain English literacy and communication; Leading, facilitating, participating, coaching, mentoring.
- Working with clients - client relations, client liaison, the practice of working with clients and the like.
- Conflict resolution – Personality analysis tools, Strategies for dealing with difficult people and the like.

T4 Scientific writing and communication encompassing:

- Types of scientific writing and communication - The distinguishing characteristics of the different types of scientific writing.
- Purpose of the different types of scientific writing - Product development justification and specifications; Management advice; Scientific papers/publications; Conference/meeting presentations; Policy documents; Planning documents; Reports and the like.
- Types of audience - The features and characteristics of an audience, including; an audience's professional, social, cultural, ethnic background and physical and academic capabilities; the importance of 'Plain English' written and oral communication.
- Scientific writing techniques - The component parts of scientific documents, including: Aim, Materials, Method, Results, Discussion, Conclusion, References; The required content of each component part; Scientific referencing techniques, including: Bibliographies, Reference Lists, Citations, Footnotes, Quotes, and Acknowledgements; Scientific labelling techniques, including: Graphs, Tables, Diagrams, and Figures; Techniques for documenting results, including: Text, Graphs, Tables, Diagrams, and Figures; Organisational standards for document and presentation production, including: Standard organisational document templates, letterheads, headers, footers, and logos.
- Oral communication techniques - Techniques for communicating to large groups, including; Conference presentations, Speeches; Techniques for communicating to small groups, including: Meeting presentations, Team discussions, planning forums and the like.
- Electronic communication formats - World-wide Web – protocols and practices; Email – protocols and practices; Transfer of information via CD Rom/Floppy Disk; Use of PDF and other secure files.
- Confidentiality considerations - Confidentiality practices to protect the

REQUIRED SKILLS AND KNOWLEDGE

organisation; Confidentiality practices to protect the client; Confidentiality practices to protect providers of information/research cohorts.

T5 Data collection techniques encompassing:

- Data types - Quantitative data, including; empirical, non-parametric, parametric; Qualitative data; Raw; Graphic; Diagrams; Original; Textual; Multimedia; Electronic and the like.
- Data Collection - Data sources; Consultation protocols and practices; Survey methodologies, including; interviews, surveys, chat rooms, focus groups; Literature reviews, including; traditional and web-based; Group facilitation and presentation; Questioning, active listening and clarification; Obstacles to data collection, including; unavailable data, inconsistent data, confidentiality, security; Data limitations.
- Evaluating data quality - Reliability; Accuracy; Clarity; Validity; Contribution to research; Relevance to research objectives.

T6 Data analysis and presentation encompassing:

- Data analysis techniques - Univariate analysis; Multivariate analysis; Decision trees; Genetic Algorithms; Neural Networks; Gap Analysis; Urgency and impact, and the like.
- Data analysis technique selection - Determining the correct analysis technique(s); Determining the correct sequence of analysis techniques; Accommodating influencing factors including research objectives, budget, timeline and quality requirements, data limitations, confidentiality, security and the like.
- Data interpretation - Determining results; determining conclusions; Benchmarking; Quality Assurance, including consideration of accuracy, validity, clarity and the like.
- Data presentation:
 - Determining the correct form of presentation for the audience, including; colleagues, scientific community, marketing and commercialisation specialists, general community, industry, mixed (i.e. conference audience).
 - Forms of documentary presentation, including reports, journal articles, scientific papers, graphs, tables, diagrams, electronic formats; Forms of verbal presentation, including meetings, client briefings, conferences, support of a new concept, need for further research, commercialisation opportunity; Quality Assurance, including accuracy, validity, clarity of information presented.

T7 Product development and trials encompassing:

- Identifying client and managerial requirements for production and trials - Required outcome(s); Key performance indicators; Timelines; Financing; Resources; Quality Assurance and the like.
- Influencing factors - Internal business goals and strategies; Technical specifications (chemical, mechanical, environmental); Industrial considerations; Regulatory considerations; Legislative considerations; Intellectual Property; Australian & International Standards; Codes of Practice; Market requirements;

REQUIRED SKILLS AND KNOWLEDGE

Resource requirements, including personnel tools and equipment (principles and practices), materials, finances and the like. Product development arrangements - Licensing agreements; Joint Ventures; Sole Ventures and the like.

- Relevant Documentation - Codes of Practice; Standard Operating Procedures; Product formulation documentation; Material safety data sheets (MSDSs); Equipment and Quality manuals; Calibration and maintenance schedules; Enterprise recording and reporting procedures; Material, equipment and product specifications and the like.
- Development & trial processes - Proof of concept; Trialing concepts; Definitions/Specifications; Types of development and trial processes, including Phase A product and trial, Phase B product and trial, User trials, Ergonomics and Usability testing; Pre-defined acceptance criteria, confidence limits; Data collection & analysis; Production; Evaluation and recommendation formulation.

T8 Intellectual property concepts encompassing:

- Intellectual Property and Australian Law - The place of Intellectual Property in Australian Law; Past cases and outcomes; Necessary considerations and the like.
- The nature of Intellectual Property - What is Intellectual Property? What isn't Intellectual Property?; Why is Intellectual Property relevant?; What can Intellectual Property rights do?; What can't Intellectual Property rights do?
- Intellectual Property Rights - Patents; Copyright; Designs; Confidential Information; Other specialty rights and the like.
- Managing Intellectual Property - Identifying Intellectual Property; Deciding what to protect; Strategies for managing Intellectual Property; How can Intellectual Property rights work together?; Intellectual Property versus time, effort, finances; Sources of Assistance, including Publications, Intellectual Property professionals, Lawyers, Business Advisors, Marketing consultants and the like.
- Enforcement of Intellectual Property - The enforcement process; The role of lawyers; Resolution.
- The changing face of Intellectual Property - Development of Intellectual Property Right Laws; Changes to Intellectual Property Right laws; Extensions of Intellectual Property Rights into non-traditional areas, including cultural, property arenas; The global marketplace and the like.

T9 Occupational Health and Safety principles and fundamentals encompassing:

- underlying principles of OH&S
- general aims and objectives of the relevant state or territory legislation relating to OH&S.
- employer and employee responsibilities, rights and obligations.
- major functions of safety committees and representatives.
- powers given to Occupational Health and Safety Inspectors
- housekeeping and potential hazards in relation to improper housekeeping
- selecting appropriate personal protective equipment (PPE) given hazardous situations

REQUIRED SKILLS AND KNOWLEDGE

T10 The work environment encompassing:

- typical hazards associated with a range of work environments
- procedures used to control the risks associated with these hazards
- principles of risk assessment / management and state the purpose of each.
- hierarchy of OH&S hazard control measures.
- required documentation for risk assessment.
- commonly used workplace safety signs.
- workplace emergencies that pose a threat to health and safety and suitable procedure for an emergency workplace evacuation.
- appropriate fire extinguisher for a given type of fire.
- requirements for the location, mounting and maintenance of portable fire extinguishers.
- basic process of fighting a fire.
- safe premises, buildings and security are important in an industrial setting and the consequences of non- compliance with these.
- standard work procedure is and why they are required in some circumstances.

T11 Manual Handling encompassing:

- typical manual handling injuries and the effect they can have on lifestyle
- situations that may cause manual handling injuries
- correct procedures for lifting and carrying to prevent manual handling injuries
- Chemicals in the workplace encompassing:
 - hazardous substances and dangerous goods.
 - Classification of chemicals as hazardous substances and/or dangerous goods
 - requirements for labelling of chemicals in the workplace
 - safe storage procedures for chemicals
 - purpose of and interpretation of material safety data sheet (MSDS)

T12 Working at heights encompassing:

- dangers associated with working on ladders and scaffolds
- identification of work area as a height risk and use appropriate safety equipment to prevent a fall
- selecting an appropriate ladder for a given situation and perform a safety check before use
- precautions that should be taken when ascending and working off a ladder
- precautions that should be taken when working on and around a scaffold and elevated platforms.

T13 Confined spaces encompassing:

- hazards associated with working in a confined space
- identifying workplace situations that could be classified as a confined space
- control measures for working in a designated confined space

REQUIRED SKILLS AND KNOWLEDGE

T14 Physical and psychological hazards encompassing:

- short and long term effects of excessive noise and techniques to avoid damage to hearing due to excessive noise
- effects of vibration on the human body and work practices to protect against vibration
- effects of thermal stress on the human body and work practices to protect against thermal stress
- effects of ultraviolet (UV) radiation on the human body and work practices to protect against UV radiation.
- dangers associated with laser operated equipment and tools and suitable protective measures to overcome the danger.
- occupational overuse syndrome, state examples of how it occurs and describe means to overcome it
- factors that cause stress in the workplace, symptoms of a person suffering from stress and personal stress management techniques
- detrimental effects and dangers of drug and alcohol use in the workplace

T15 Working safely with electricity encompassing:

- effects of electric shock on the human body
- common causes of electrical accidents
- precautions that can minimise the chance of electric shock (earthing, extra low voltage, fuses, circuit breakers and residual current devices – RCDs)
- protection offered by a residual current device (RCD)
- need for ensuring the (safe) isolation of an electrical supply
- appropriate method of removing an electric shock victim from a live electrical situation

T16 Life support - CPR in the workplace encompassing:

- First Aid.
- responsibilities of the First Aider.
- priorities of first aid management for any accident or injury.
- procedures required at an accident scene.
- legal and ethical issues, which may impact on the management of care.
- 'Duty of Care'.
- examination of a casualty for injuries.
- effect of cardio pulmonary arrest on the body.
- Managing simulated conditions of: airway obstruction; respiratory arrest and cardio pulmonary arrest,
- single and two-person cardio pulmonary resuscitation (CPR).
- signs and symptoms of an altered level of consciousness
- management of simulation of a casualty with an altered level of consciousness.
- signs and symptoms of shock.

REQUIRED SKILLS AND KNOWLEDGE

- management of simulation of a casualty in shock

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These

EVIDENCE GUIDE

points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Contribute to the trial of a product/application/service as described in 8) and including:
 - A Demonstrating consistent performance for each Element of the unit
 - B Meeting the performance criteria associated with

EVIDENCE GUIDE

each Element of the unit by employing techniques, procedures, information and resources available in the workplace

- C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled 'Essential knowledge and associated skills'.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to contributing to the trial of a product/application/service.

EVIDENCE GUIDE**Method of assessment****9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units**9.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

BSXFM1504A Participate in, lead and facilitate work teams

UEENEER001B Contribute to the planning of a research project

UEENEER002B Conduct to the conduct of a research project

UEENEER004B Contribute to the trial of a product/application/service

UEENEER005B Contribute to intellectual property management

BSBCM306A Produce business documents

BSBSBM405A Monitor and manage business operations

UEENEER006B Contribute to the commercialisation of a product/application/service

PMBQUAL309 Solve problems using 'quality tools'
A

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the trial and, where necessary, retrieval of products, applications and/or services to meet the requirements of a development brief.

Product/application/service design and development briefs may be provided by external and/or internal clients.

Typically the work covered by this unit is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. This generally involves working closely with a range of management and production/operations personnel and requires balancing the business and technical sides of the product/application/service being developed.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain those sections of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the tasks undertaken in trailing products/applications/services. They should be aware of enterprise business goals and the impact of trials on these goals.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Resources, which may be subject to negotiation

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5
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2.2) Literacy and numeracy skills

Competency Field 5)

Research

UEPOPS507B Conduct project management

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit deals with the skills and knowledge required to plan, implement, monitor and complete project work.

Application of the Unit

Application of the Unit 2)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships and the like.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

There are no pre-requisite units.

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following levels. A description of what each level entails is provided in Section 2.3.1 Language, Literacy and Numeracy.

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan and prepare	1.1 Work scope, desired outcomes, budget and key dates are identified
	1.2 Required resources and clients are identified, availability assessed, and allocated for effective management and completion of the project
	1.3 The preparation of technical specifications is coordinated and achieved within key dates
	1.4 Agreements with service providers and clients is coordinated and established within key dates
	1.5 An integrated overview plan is prepared and distributed for review by personnel involved in and/or influenced by the project
	1.6 Areas for potential over-run and resource complications are assessed
	1.7 Availability of up to date documentation, materials and equipment as referred to in specification, is ensured
	1.8 Communication processes such as regular meetings are organised to meet the needs of project clients/customers and service providers
	1.9 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of the on-the-job training

ELEMENT	PERFORMANCE CRITERIA
2 Coordinate project plan	2.1 Plant isolation and access requirements are coordinated in accordance with statutory, industry and enterprise/site standards
	2.2 Specialist equipment and/or personnel are coordinated to achieve desired project outcomes
	2.3 Communication processes are executed to ensure adequate information flow
	2.4 Project progress and costs are regularly reviewed and compared with base-line plans
	2.5 Deviations from plan are identified and actions taken to recover original project program
	2.6 Deviations from original program requirements are reported to the appropriate personnel and when appropriate direction is sought
	2.7 Project is regularly reviewed in relation to safety, quality, resources, time frame, costs and equipment
3 Complete documentation	3.1 Quality assurance documents and outage reports are provided in accordance with statutory and enterprise/site requirements
	3.2 Plant and maintenance records are updated in accordance with enterprise/site requirements
	3.3 Plant availability is declared on completion of the project
	3.4 Project completion is reviewed against the established plan, and opportunities for future improvement are established and documented

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired conducting project management.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

The extent of the Essential Knowledge and Associated Skills required follows:

KS01-PO507B Conduct project management

T1 Evidence shall show that knowledge has been acquired for safe working practices of:

- Relevant environmental, occupational health and safety legislation and regulations
- Enterprise procedures
- Plant drawings and manufacturers manuals
- Introduction to and typical arrangements of power production plant
- Relevant plant and equipment, its location and operating parameters
- Enterprise recording procedures
- Quality assurance and control procedures
- Enterprise financial and contractual procedures
- Project management principles and concepts
- Work scope coordination and preparation
- Interpersonal skills techniques
- Stakeholder management techniques
- Time management techniques
- Leadership techniques
- Liaising with contractors and clients
- Project management techniques
- Project planning techniques
- Leadership techniques
- Contractual principles

T2 Specific skills needed to achieve the performance criteria:

- Interpret plant drawings and manufacturers manuals
- Apply relevant state and territory regulations
- Identify interactions and conflict of plant and work scope
- Respond to deviations from original plans
- Apply quality assurance/quality control procedures
- Work scope coordination and preparation

REQUIRED SKILLS AND KNOWLEDGE

- Manage human resources
- Communicate effectively
- Apply contractual procedures
- Monitor income and expenditure
- Manage time and resources
- Apply project management principles
- Contribute to/prepare project plans
- Coordinate a project plan.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the range statement of the competency standard unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitude competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all pre-requisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UEP12". Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in 6) of this unit
 - Demonstrate an appropriate level of employability skills
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated performance across a representative range of

contexts from the prescribed items below:

- Knowledge and application of relevant sections of: Occupational Health and Safety legislation; Statutory legislation; Enterprise/site safety procedures; Enterprise/site emergency procedures
- Knowledge of project management principles, the ability to apply project management principles, Business principles, Performing project management, Communicating effectively
- Dealing with an unplanned event by drawing on Essential Knowledge and Skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this competency standard unit.

Competency Standards should be assessed in the workplace or simulated workplace and under the normal range of workplace conditions.

Assessment of this unit will be supported with documentary evidence, by means of endorsement stating type and application of work.

In addition to the resources listed above in Context of assessment', evidence should show competency working, in limited spaces, with different types of plant and equipment as well as different structural/construction types and methods and in a variety of environments.

Method of assessment 9.4)

This unit shall be assessed by methods given in Section 1.3.00 Assessment Guidelines.

Note: Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the Essential Knowledge and Skills described in this unit.

**Concurrent
assessment and
relationship with
other units** **9.5)**

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed with allied competency standard units where listed

Nil

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

Documentation may include job cards, budgets, cost centres, check sheets, safety rule procedures, plant records, drawings, quality assurance procedures and documentation, maintenance procedures and outage reports, codes of practice, and contract specifications.

Project management may include a set of interrelated activities, with defined start and end dates, designed to achieve a unique and common objective; the planning, organising, monitoring and controlling of all aspects of a project in a continuous process to achieve its objectives, both internal and external; and major project work.

Resources may include service providers, materials, plant, equipment, tools, finances and specialists.

Service providers may include but are not limited to internal staff and specialists, external specialists, contractors and contract specialists.

Finalisation of work agreements may include but is not limited to procurement procedures for period orders, fixed price and/or variable contracts, proprietary line contractors, internal and external service agreements and local/contract staff commitments.

Work performed to be in accordance with legislation and relevant codes of practice; Occupational Health and Safety, quality assurance (relevant Australian standard) and environmental legislation.

Coordination may include supplementary personnel, clients, service providers, plant and equipment.

Plant and equipment storage requirements may depend on length of the project and plant needs.

Generic terms are used throughout this Training Package for vocational standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms are given in Section 2.1 Preliminary Information and Glossaries.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)
Operations.

UEPOPS520A Evaluate cost estimations and initiate appropriate solutions

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor

1) Scope:

1.1) Descriptor

This unit deals with the skills and knowledge required to evaluate cost estimations for planned and forced plant outages (plant may be a single item or whole unit) and to initiate appropriate solutions.

Application of the Unit

Application of the Unit 2)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice 3)

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships and the like.

Pre-Requisites

Prerequisite Unit(s) 4)

Competencies 4.1)

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.

Common Unit Group

Unit Code	Unit Title
UEENEEC005B	Estimate electrotechnology projects

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following levels. A description of what each level entails is provided in Section 2.3.1 Language, Literacy and Numeracy.

Reading	5	Writing	5	Numeracy	5
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Employability Skills Information

Employability Skills 5)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

- 6) Elements describe the essential outcomes of a competency standard unit. Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Evaluate work details	1.1 Work plan and methods are evaluated including preparation and re-commissioning
	1.2 Time frame of work is analysed including required working patterns
	1.3 Details of materials, equipment, specialist services and contractual provisions are analysed
	1.4 Any specific disposal requirements are evaluated
	1.5 Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of the on-the-job training
2 Identify costs	2.1 Costs associated with the outage are evaluated in accordance with appropriate procedures
	2.2 Previous planned and forced outages are analysed to determine problem areas
	2.3 Possible problem areas are evaluated
3 Develop solutions	3.1 Potential solutions to limit time frame over runs are identified
	3.2 Potential variations in work scope are identified and solutions developed
4 Complete documentation	4.1 Evaluation report documentation is produced in accordance with appropriate procedures
	4.2 Possible problem areas are documented and produced in accordance with appropriate procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired evaluating cost estimations and initiating solutions.

The extent of the Essential Knowledge and Associated Skills required follows:

KS01-PO520A Cost estimations and appropriate solutions

T1 Evidence shall show that knowledge has been acquired for safe working practices of:

- Relevant environmental, occupational health and safety legislation and regulations
- Enterprise procedures
- Plant drawings and manufacturers manuals
- Introduction to and typical arrangements of power production plant
- Relevant plant and equipment, its location and operating parameters
- Enterprise recording procedures
- Costing and quotation techniques and procedures
- Employment awards and agreements
- Penalty and transfer pricing procedures and systems
- Enterprise evaluation procedures

T2 Specific skills needed to achieve the Performance Criteria:

- Interpret plant drawings and manufacturers manuals
- Apply relevant state and territory regulations
- Apply enterprise recording procedures
- Communicate effectively
- Apply data analysis techniques and tools
- Compile data
- Identify cause and consequence of potential cost excursions
- Produce quotations
- Produce cost options
- Develop solutions

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this competency standard unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitude competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the “Assessment Guidelines – UEP12”. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement
 - Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in 6) Essential Knowledge and Associated Skills of this unit
 - employability skillsConduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedure
- Demonstrated performance across a representative range of contexts from the prescribed items below:
 - The knowledge and application of relevant sections of: Occupational Health and Safety legislation; Statutory legislation; Enterprise/site safety procedures; Enterprise/site emergency procedures
 - Costing and quotation techniques and procedures
 - Employment awards and agreements
 - Penalty and transfer pricing procedures and systems
 - Data analysis
 - Dealing with an unplanned event by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above

listed items.

**Context of and
specific
resources for
assessment** **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Competency Standards should be assessed in the workplace or simulated workplace and under the normal range of workplace conditions.

Assessment of this unit will be supported with documentary evidence, by means of endorsement stating type and application of work.

In addition to the resources listed above in Context of assessment', evidence should show competency working in limited spaces with different types of plant and equipment as well as different structural/construction types and methods and in a variety of environments.

**Method of
assessment** **9.4)**

This unit shall be assessed by methods given in Section 1.3.00 Assessment Guidelines.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units 9.5)

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed with allied competency standard units where listed.

Nil

Range Statement**RANGE STATEMENT**

10) This relates to the competency standard unit as a whole, providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.

Documentation may include drawings, material lists, maintenance methods and plans, spare parts information, specifications and quotes.

Resources may include internal and external service providers and personnel.

Costed work may be in accordance with the following legislation: Occupational Health and Safety; quality assurance standards; environmental, enterprise/site standards and agreements.

Costs may include labour, spares, specialist services, disposal of waste and contractual costs, various options are: schedule of rates, period of quote validity and variations from original specification detailed.

Generic terms are used throughout this Training Package for vocational standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms are given in Section 2.1 Preliminary Information and Glossaries.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field 11)

Operations